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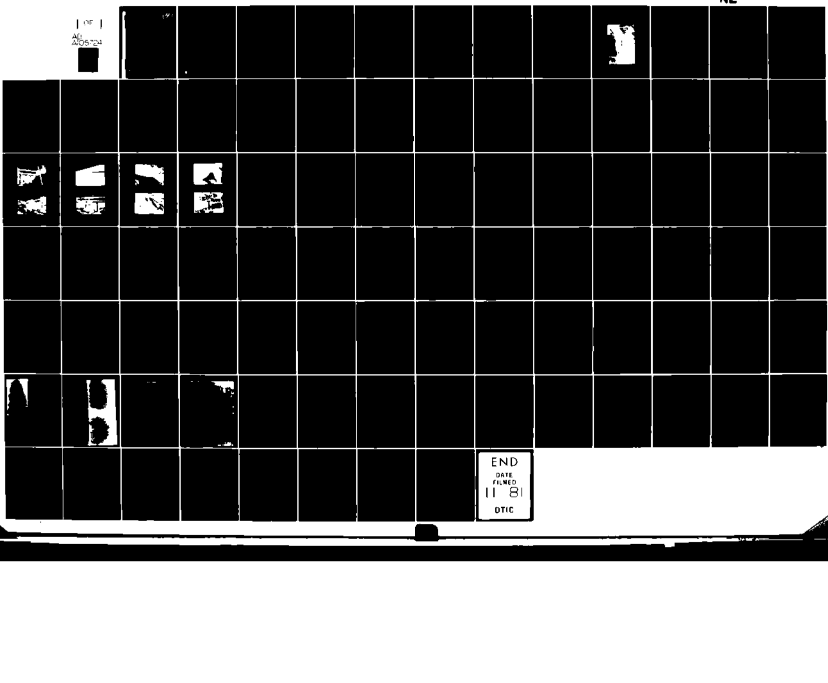

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LEVEL II

LOWER HUDSON RIVER BASIN

LAKE PEEKSKILL DAM

PUTNAM COUNTY, NEW YORK
INVENTORY NO. N.Y. 87

PHASE I INSPECTION REPORT
NATIONAL DAM SAFETY PROGRAM

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NEW YORK DISTRICT CORPS OF ENGINEERS

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Putnam County
Lower Hudson River Basin

20. ABSTRACT (Continue on reverse side if necessary and identify by block number)

This report provides information and analysis on the physical condition of the dam as of the report date. Information and analysis are based on visual inspection of the dam by the performing organization.

Examination of available documents and a visual inspection of the dam and appurtenant structures did not reveal conditions which constitute an immediate hazard to human life or property.

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SECURITY CLASSIFICATION OF THIS PAGE (When Data Entered)

Using the Corps of Engineers' screening criteria, it has been determined that the dam would be overtopped for all storms exceeding approximately 77 percent of the Probable Maximum Flood (PMF). Therefore, the spillway is adjudged "inadequate."

Structural stability analyses based on available information, indicate that the factors of safety against overturning are generally low, and the locations of the resultants fall outside the middle 1/3 (except for analyses of the normal pool loading conditions). When the dam is subjected to severe loading conditions such as an ice load or a PMF event, the factors of safety fall to critical levels. Therefore, it is recommended that further analyses of the structural stability be performed within three months of owner notification. These analyses will determine the appropriate remedial measures required.

Formal inspection and maintenance procedures should be developed with records maintained for future reference.

A formal warning system and emergency action plan should be developed and put into operation as soon as possible.

The seeps should be monitored at regular intervals for turbidity and increase in flow.

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PREFACE

This report is prepared under guidance contained in the Recommended Guidelines for Safety Inspection of Dams, for Phase I Investigations. Copies of these guidelines may be obtained from the Office of Chief of Engineers, Washington, D.C. 20314. The purpose of a Phase I Investigation is to identify expeditiously those dams which may pose hazards to human life or property. The assessment of the general condition of the dam is based upon available data and visual inspections. Detailed investigation and analyses involving topographic mapping, subsurface investigations, testing, and detailed computational evaluations are beyond the scope of a Phase I Investigation; however, the investigation is intended to identify any need for such studies.

In reviewing this report, it should be realized that the reported condition of the dam is based on observations of field conditions at the time of inspection along with data available to the inspection team. In cases where the reservoir was lowered or drained prior to inspection, such action, while improving the stability and safety of the dam, removes the normal load on the structure and may obscure certain conditions which might otherwise be detectable if inspected under the normal operating environment of the structure.

It is important to note that the condition of a dam depends on numerous and constantly changing internal and external conditions, and is evolutionary in nature. It would be incorrect to assume that the present condition of the dam will continue to represent the condition of the dam at some point in the future. Only through frequent inspections can unsafe conditions be detected and only through continued care and maintenance can these conditions be prevented or corrected.

Phase I inspections are not intended to provide detailed hydrologic and hydraulic analyses. In accordance with the established Guidelines, the Spillway Test flood is based on the estimated "Probable Maximum Flood" for the region (greatest reasonably possible storm runoff), or fractions thereof. Because of the magnitude and rarity of such a storm event, a finding that a spillway will not pass the test flood should not be interpreted as necessarily posing a highly inadequate condition. The test flood provides a measure of relative spillway capacity and serves as an aide in determining the need for more detailed hydrologic and hydraulic studies, considering the size of the dam, its general condition and the downstream damage potential.

PHASE I INSPECTION REPORT
NATIONAL DAM SAFETY PROGRAM
LAKE PEEKSKILL DAM
I.D. No. NY 87
DEC DAM No. 213C-814 LOWER HUDSON RIVER BASIN
PUTNAM COUNTY, NEW YORK

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PHASE I INSPECTION REPORT
NATIONAL DAM SAFETY PROGRAM

Name of Dam:	Lake Peekskill Dam (I.D. No. NY 87)
State:	New York
County:	Putnam
Stream:	Unnamed Tributary of Peekskill Hollow Brook
Date of Inspection:	6 March 1981

ASSESSMENT

Examination of available documents and a visual inspection of the dam and appurtenant structures did not reveal conditions which constitute an immediate hazard to human life or property.

Using the Corps of Engineers' screening criteria, it has been determined that the dam would be overtopped for all storms exceeding approximately 77 percent of the Probable Maximum Flood (PMF). Therefore, the spillway is adjudged "inadequate."

Structural stability analyses based on available information, indicate that the factors of safety against overturning are generally low, and the locations of the resultants fall outside the middle 1/3 (except for analyses of the normal pool loading conditions). When the dam is subjected to severe loading conditions such as an ice load or a PMF event, the factors of safety fall to critical levels. Therefore, it is recommended that further analyses of the structural stability be performed within three months of owner notification. These analyses will determine the appropriate remedial measures required.

Formal inspection and maintenance procedures should be developed with records maintained for future reference.

A formal warning system and emergency action plan should be developed and put into operation as soon as possible.

The seeps should be monitored at regular intervals for turbidity and increase in flow.

The following remedial measures must be completed within one year:

1. The far left bridge support should be underpinned and protected from future erosion.

2. The debris should be cleaned from the upstream side and bottom discharge area of the spillway.

3. The trees in the spillway discharge channel should be cut off at ground level.

4. Repair the spalled concrete on the spillway and dam.

5. Install a staff gage to monitor reservoir levels.

SUBMITTED: Granville Kester, Jr.
Granville Kester, Jr., P.E.
Vice President
MICHAEL BAKER, JR. of New York, INC.

APPROVED: [signature]
Colonel W.M. Smith, Jr.
New York District Engineer

DATE: 14 Aug 81

Overall View of Dam
Lake Peekskill Dam
I.D. No. NY 87
6 March 1981

PHASE I INSPECTION REPORT
NATIONAL DAM SAFETY PROGRAM
LAKE PEEKSKILL DAM
I.D. No. NY 87
DEC DAM No. 213C-814
LOWER HUDSON RIVER BASIN
PUTNAM COUNTY, NEW YORK

SECTION 1: PROJECT INFORMATION

1.1 GENERAL

a. Authority - The Phase I Inspection reported herein was authorized by the Department of the Army, New York District, Corps of Engineers, to fulfill the requirements of the National Dam Inspection Act, Public Law 92-367.

b. Purpose of Inspection - This inspection was conducted to evaluate the existing conditions of the dam, to identify deficiencies and hazardous conditions, to determine if these deficiencies constitute hazards to life and property, and to recommend remedial measures where required.

1.2 DESCRIPTION OF PROJECT

a. Description of Dam - Lake Peekskill Dam is a concrete gravity dam 15.6 feet high measured from the crest to the toe of the dam. The dam is 120 feet long with a vertical upstream face and sloped downstream face (sloping 2V:1H). The crest of the dam is an abandoned highway bridge deck 16 feet wide with a new highway bridge built approximately 1.2 feet above the abandoned bridge deck. The spillway consists of two 3-foot high by 6-foot wide (perpendicular to flow) openings. The spillway crest has a breadth of 4 feet (parallel to flow).

The discharge channel is steep and contains rock outcrops. A small breached dam is located approximately 500 feet downstream.

b. Location - Lake Peekskill Dam is located on an unnamed tributary of Peekskill Hollow Brook and is 2-1/2 miles northeast of Peekskill, New York. The reservoir and dam are located in Putnam County, New York. The coordinates of the dam are N 41° 20.2' and W 73° 52.8'. The dam can be found on the

Peekskill, New York, USGS 7.5 minute topographic quadrangle. A Location Map is shown in Appendix E.

c. Size Classification - Lake Peekskill Dam is 15.6 feet high, and the reservoir storage capacity at the minimum top of the dam (Elevation 295.6 feet M.S.L.) is 1357 acre-feet. Therefore, the dam is in the "intermediate" size category as defined by the Recommended Guidelines for Safety Inspection of Dams (Reference 14, Appendix D).

d. Hazard Classification - Two houses are located 1600 feet downstream from the dam. Loss of life in the homes is likely if the dam were to fail. Lake Peekskill Dam is therefore considered in the "high" hazard category as defined by the Recommended Guidelines for Safety Inspection of Dams.

e. Ownership - The dam and reservoir are owned and operated by Lake Peekskill Improvement District, Box 317, Lake Peekskill, New York. The contact person is Mr. A. Purdy (telephone 914-528-9745).

f. Purpose of the Dam - Lake Peekskill is used for recreational purposes.

g. Design and Construction - Allan Smith, Professional Engineer, Cold Spring, N.Y., designed the dam in 1928. No date or contractor for construction is known.

h. Normal Operating Procedure - The reservoir level is typically maintained at the spillway crest. The owner's representative reported that the dam is checked four or five times a year for leaks and debris, and the reservoir is lowered in the fall to clean around the shorelines.

1.3 PERTINENT DATA

a. Drainage Area (Acres) - 386.0

b. Discharge at Dam (c.f.s.)

Spillway Capacity (at Minimum Top of Dam Elev. 295.6 ft. M.S.L.)	589.0

c. Elevation (Feet Above M.S.L.)[1] -

Minimum Top of Dam	295.6
Normal Pool (Spillway Crest)	291.0
Streambed at Toe of Dam	280.0

d. Reservoir Surface (Acres) -

Top of Dam (Elev. 295.6 ft. M.S.L.)	67.0
Spillway Crest (Elev. 291.0 ft. M.S.L.)	52.0

e. Reservoir Storage Capacity (Acre-Feet) -

Top of Dam (Elev. 295.6 ft. M.S.L.)	1357.0
Spillway Crest (Elev. 291.0 ft. M.S.L.)	1074.0

f. Dam -

Type: Concrete gravity

Length (Feet)	120.0
Height (Feet)	15.6
Top Width (Feet)	16.0
Side Slopes - Upstream	Vertical
Downstream	2V:1H

g. Spillway -

Type: Two 3-ft. x 6-ft. openings.

Crest Length Perpendicular to Flow (Feet)	12.0
Crest Width Parallel to Flow (Feet)	4.0
Crest Elevation (Feet M.S.L.)	291.0

h. Reservoir Drain -

The original 24-inch outlet pipe was plugged with concrete in 1948. Therefore, the outlet pipe is not operable.

[1]All elevations are referenced to the spillway crest, Elev. 291.0 ft. M.S.L., estimated from the USGS 7.5 minute topographic quadrangle, Peekskill, NY.

SECTION 2: ENGINEERING DATA

2.1 GEOLOGY

The Lake Peekskill Dam is located in the southern end of the "New England Uplands" physiographic province of New York State. This province is geologically complex and characteristically composed of a diverse group of igneous and metamorphic rocks which have been tectonically disturbed by a number of normal and thrust faults.

Bedrock in the immediate vicinity of the dam is represented by Ordovician and Precambrian rocks. The Ordovician rocks are composed of a hornblende diorite and the Manhattan Formation, a sillimanite, garnet, muscovite, biotite, plagioclase, and quartz gneiss. The Precambrian rocks consist of an amphibolite and a biotite granitic gneiss. The contact between the Ordovician diorite and the Precambrian amphibolite is located just east of Lake Peekskill. Two major fault systems are present within approximately 2 miles of either side of the lake. The first and most extensive faulting runs northeast-southwest and is located north of the lake. The second set of faults are located southeast of the lake and trend northwest to southeast. In both cases, these faults are probably best classified as high angle reverse faults.

2.2 SUBSURFACE INVESTIGATION

Original subsurface information was not available for reference as a part of this investigation. Four borings were performed in 1968 in conjunction with the design of the new bridge structure. The location of these four borings is shown on Plate 2 (Appendix E) of this report. The boring logs are presented in Appendix F, Background Documents. Borings on the right abutment (S-1 and S-2) indicate approximately 4 feet of soil overlying greenish gray gneiss. The soil was logged as "brown coarse-fine sand with little-to-some silt and a trace of med.-fine gravel." The left abutment borings (S-3 and S-4) indicate 3.0 feet and 6.5 feet, respectively, of soil overlying greenish gray gneiss. Boring S-3 was logged as "brown coarse-fine sand, little silt, trace coarse-fine gravel." Boring S-4 was logged as "brown coarse-fine sand, little coarse-fine gravel, little silt."

According to the available soils report (interim) for Putnam County prepared by the Putnam County Soil and Water Conservation District, the soils in the vicinity

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of the dam are of the Hollis-Charlton Association. These soils are described as "shallow, excessively-to-well drained, sandy loam soils and deep, well-drained stony, sandy loam soils that have a permeable subsoil and substratum."

2.3 DAM AND APPURTENANT STRUCTURES

Plans for the dam and original bridge prepared by Allan Smith, P.E., Cold Spring, New York, circa 1928, were obtained from Mr. Ron Kobbe, Putnam County Highway Department, 351 Fair Street, Carmel, New York 10512. Design drawings for the new bridge, circa 1969, were also obtained from Mr. Kobbe.

The dam is a concrete semi-gravity dam with a vertical upstream face, crest width of 16 feet and a sloped downstream face (sloping 2V:1H). The spillway consists of two 3-foot high by 6-foot wide openings. A highway bridge has been built above the dam.

2.4 CONSTRUCTION RECORDS

No construction records were available for this investigation.

2.5 OPERATION RECORDS

Formal operation records are not maintained by the owner. The dam is checked four or five times annually for leaks and debris, and the reservoir is lowered in the fall to clean around the shorelines.

2.6 EVALUATION OF DATA

The background information collected during this investigation was obtained primarily from the New York State Department of Environmental Conservation files. Supplementary information was acquired through conversations with Mr. A. Purdy, representing the Lake Peekskill Improvement District. Design drawings were obtained through Mr. Kobbe of the Putnam County Highway Department. The available data are considered adequate and reliable for Phase I Inspection purposes.

SECTION 3: VISUAL INSPECTION

3.1 FINDINGS

a. General - The inspection was performed on 6 March 1981. The weather was sunny with a temperature of 30°F. One to two inches of snow had fallen two days previously, but the dam and structures were not covered during the inspection. The water surface was 0.5 feet above the crest. Deficiencies found during the inspection will require remedial treatment. A Field Sketch of conditions found during the inspection is included in Appendix E. The complete Visual Inspection Checklist is presented as Appendix B.

b. Spillway - The spillway consists of two 3-foot x 6-foot openings and is located 25 feet from the left abutment. The two openings were 4 feet wide.

Debris was located on the upstream side of the spillway and where the spillway junctions with the discharge channel.

c. Dam - The dam is a concrete structure 120 feet long with a height of 15.6 feet. An abandoned bridge deck is the top of the dam, and a new bridge is located 1.2 feet above this structure. Seepage was observed exiting from the right downstream buttress near the spillway. This concrete buttress is also spalled and partially deteriorated. Seepage was also observed 2 feet from the left bridge column of the abandoned bridge. The owner's representative reported seeing seepage exiting from the right toe of the dam near the spillway. The inspection team was unable to locate this seepage because of the debris present at this location. The abandoned bridge deck is spalled. The far left downstream (abandoned) bridge support has been undermined. No major cracking of the dam was observed.

d. Outlet Works - The outlet works for the dam are no longer operable, as they are filled with concrete. The only means of lowering the reservoir level is by two 6-inch PVC pipes (used as siphons) placed over the spillway crest.

e. Downstream Channel - The downstream channel is steep and contains rock outcrops. Trees are located in the channel.

A small breached dam structure is located approximately 500 feet downstream. This dam is currently non-impounding but would impound water if excessively heavy flows in the creek were greater than the capacity of the breached portion. This structure is of masonry construction and is in need of repair.

Two houses and a road are located 1600 feet downstream from the dam. The stream flows through a 48-inch diameter culvert under the road.

f. Reservoir - The slopes of the reservoir are moderate and covered by homes and vegetation. There were no signs of instability, and sedimentation was not reported to be a problem.

3.2 EVALUATION

The visual inspection revealed several deficiencies in this structure. The following items were noted:

1. Seepage was observed exiting the right downstream buttress near the spillway;

2. Seepage was observed exiting near the downstream left bridge column of the abandoned bridge.

3. Seepage was observed at the right toe of the dam.

4. The far left bridge support has been undermined.

5. Debris was located on the upstream side of the spillway;

6. Debris was located at toe of the spillway discharge area;

7. The outlet works have been sealed and are no longer operable;

8. Trees are located in the discharge channel,

9. The spillway and dam have minor spalling on its concrete surfaces,

SECTION 4: OPERATION AND MAINTENANCE PROCEDURES

4.1 PROCEDURES

There are no formal written instructions for operating the reservoir. The normal water surface elevation is at the spillway crest, but because of recent precipitation, the water surface was 0.5 feet above the crest at the time of the inspection. The reservoir is used for recreation. Two 6-inch PVC pipes (used as siphons) were on the spillway crest.

4.2 MAINTENANCE OF THE DAM

Maintenance of the dam is the responsibility of the Lake Peekskill Improvement District. The maintenance foreman checks the dam four or five times a year. He visually inspects it for cracks and seepage. Maintenance is performed when funds are available.

4.3 WARNING SYSTEM

At the time of the inspection, there was no warning system or emergency action plan in operation.

4.4 EVALUATION

Past maintenance of the dam and operating facilities appears to have been adequate, but the past activities have gone undocumented. A checklist should be compiled by the owner's representative to document the findings made during the periodic inspections and the maintenance items completed. A warning system and emergency action plan should be developed and put into operation.

SECTION 5: HYDRAULIC/HYDROLOGY

5.1 DRAINAGE AREA CHARACTERISTICS

Delineation of the watershed of Lake Peekskill Dam was made using the USGS quadrangle for Peekskill, New York. The drainage basin has steep slopes near the reservoir with extensive lakeside development in the 386-acre drainage area. No storage exists upstream of the reservoir.

5.2 ANALYSIS CRITERIA

A hydrologic analysis of the watershed and hydraulic analysis of the dam was conducted using the U.S. Army Corps of Engineers' Flood Hydrograph Package HEC-1 DB computer program (Reference 12, Appendix D). The unit hydrograph was defined using the Snyder's Unit Hydrograph Method. Estimates of Snyder's hydrograph coefficients were developed from average coefficients from the Hydrologic Flood Routing Model for Lower Hudson River Basin (Reference 16, Appendix E). Precipitation data was taken from Hydrometeorological Report No. 33 (Reference 8, Appendix D). Rainfall losses were estimated at an initial loss of 1.0 inch and a constant loss rate of 0.1 inch per hour thereafter. The hydraulic capacity of the dam, reservoir and spillway was determined by incorporating the Modified Puls Routing Method. All flood routings were begun with the reservoir at normal pool level. Outlet discharge capacity was computed by hand. The Probable Maximum Flood (PMF) and 1/2 Probable Maximum Flood (1/2 PMF) were developed and routed through the reservoir.

5.3 SPILLWAY CAPACITY

The spillway consists of two 3-foot by 6-foot openings near the center of the dam. The spillway has a capacity of 589 cubic feet per second (c.f.s.) at the top of the dam. There is no auxiliary or emergency spillway at Lake Peekskill Dam.

5.4 RESERVOIR CAPACITY

The storage capacity of Lake Peekskill Dam at normal pool is 1074 acre-feet. The storage capacity of the reservoir at the minimum top of dam is 1357 acre-feet. Therefore, flood control storage of the reservoir between the spillway crest and top of dam is 283 acre-feet. This volume represents a total of 8.80 inches of runoff from the watershed.

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5.5 FLOODS OF RECORD

No information concerning the effects of significant floods on the dam is available.

5.6 OVERTOPPING POTENTIAL

The maximum capacity of the spillway is 589 c.f.s. before overtopping would occur. The peak outflows of the PMF and 1/2 PMF are 693 c.f.s. and 316 c.f.s., respectively. Therefore, the spillways are capable of passing 77 percent of the PMF before overtopping would occur.

5.7 RESERVOIR EMPTYING POTENTIAL

The reservoir can be drawn down by two 6-inch P.V.C. siphon pipes. The maintenance foreman stated that it takes one month to lower the reservoir 4 to 5 feet.

5.8 EVALUATION

Lake Peekskill Dam is an "intermediate" size - "high" hazard dam requiring the spillway to pass the PMF. The PMF and 1/2 PMF were routed through the watershed and dam. It was determined that the spillway is capable of passing 77 percent of the PMF before overtopping the dam. Therefore, the spillway is judged "inadequate."

Conclusions pertain to present conditions and the effect of future development on the hydrology has not been considered.

SECTION 6: STRUCTURAL STABILITY

6.1 EVALUATION OF STRUCTURAL STABILITY

a. Visual Observations - No signs of instability were observed during the field inspection. Minor problems observed which may affect the stability of the structure include:

1. Clear seepage was observed exiting the right downstream buttress near the spillway.

2. Clear seepage was observed exiting near the left downstream bridge column of the abandoned bridge.

3. The spillway and dam have minor spalling, especially at the point of seepage exiting on the right downstream buttress, on its concrete surfaces. No major cracks were observed.

4. The owner's representative reported seepage exiting at the right toe of the spillway. However, this seepage was not observed due to the amount of debris present at this location.

5. The left downstream abandoned bridge column footing is partially undermined.

b. Design and Construction Data - Design information regarding the stability of the structure is unavailable.

c. Operating Records - Operating records are unavailable. The reservoir is typically at the same elevation as the spillway crest, except during the 1 October to 31 December period when the reservoir is drawn down 4 to 5 feet to facilitate shoreline and dock maintenance.

d. Post Construction Changes - The structure was built circa 1928. The outlet drain pipe was plugged with concrete in 1948. Around 1970, a new bridge was installed spanning over the dam to replace the existing bridge deck founded on the crest of the dam. The previous bridge deck was then left in place and abandoned.

6.2 STABILITY ANALYSIS

The results of any previous stability analyses were unavailable for reference during this evaluation. A structural stability analysis was conducted at the spillway location which coincides with the maximum section of the dam. The cases analyzed and respective results are as follows:

Case	Description of Loading Conditions
1	Normal operating conditions with the reservoir at the spillway crest (Elev. 291 ft. M.S.L.), full uplift, and with a tailwater of 1.0 foot.
2	Same as Case 1 with additional ice loading of 5000 pounds per lineal foot at normal pool level.
3	Reservoir level during the 1/2 PMF (Elev. 294.4 ft. M.S.L.), full uplift, with a tailwater of 1.5 feet.
4	Reservoir level during the PMF (Elev. 296.5 ft. M.S.L.), full uplift, with a tailwater of 2.0 feet.

Case	Factor of Safety Overturning	Factor of Safety Sliding	Location of Resultant from Toe (ft.)
1	1.89	6.15	4.51
2	0.83	2.90	-1.98
3	1.26	3.81	2.26
4	1.04	3.06	0.46

Notes: Location of middle 1/3 is 7.0 to 3.5 feet from the downstream toe.

A negative (-) above indicates that the location of the resultant is downstream from the toe.

A value of 2 ksf was used as a conservative approximation of the shear strength of weathered rock.

In all cases analyzed, the factors of safety against sliding are near or exceed a recommended value of three. The factors of safety against overturning are low, and the locations of the resultants (except Case 1) fall outside of the middle 1/3. Therefore, the dam is considered unsafe against overturning. However, the structure has withstood normal loading conditions in the past without apparent damage, and the analyses may not indicate the true field conditions or proper loading conditions. Because overturning during the SDF would result in a probable loss of life downstream of the dam, a detailed stability analysis of the dam should be performed by a qualified engineering firm within three months of owner notification.

6.3 SEISMIC STABILITY

Lake Peekskill Dam is located in Seismic Zone 1 which presents no hazard from earthquakes according to the Recommended Guidelines for Safety Inspection of Dams by the Department of the Army, Office of the Chief of Engineers. This determination is contingent on the requirements that static stability conditions are satisfactory, and conventional safety margins exist. As presented in Paragraph 6.2, conventional safety margins against overturning were not indicated by the analyses. If the detailed stability analysis indicates conventional safety margins, then there should be no hazard due to potential earthquakes. However, if the detailed stability analysis indicates low factors of safety against overturning, then a seismic stability evaluation should be performed as a part of the detailed stability analysis.

SECTION 7: ASSESSMENT/RECOMMENDATIONS

7.1 ASSESSMENT

a. Safety - Examination of available documents and visual inspections of Lake Peekskill Dam did not reveal any conditions which are considered to be hazardous.

Using the Corps of Engineers' screening criteria for review of spillway adequacy, it has been determined that the dam would be overtopped for all storms exceeding approximately 77 percent of the PMF. The overtopping of the dam could result in dam failure, increasing the hazard to loss of life downstream. Therefore, the spillway is adjudged "inadequate."

The stability analyses of the dam performed for this investigation indicate that the factors of safety against overturning may be inadequate.

b. Adequacy of Information - The information available and the observations and measurements made during the visual inspection are considered sufficient for this Phase I Inspection Report.

c. Need for Additional Investigation - A detailed stability analysis of the dam is considered necessary to determine actual stability conditions.

d. Urgency - The stability analyses must be initiated within three months of notification to the owner. Within one year, remedial measures resulting from these investigations must be initiated, with completion of these measures during the following year. In the interim, a detailed emergency action plan must be developed and implemented during periods of unusually heavy precipitation. Around-the-clock surveillance must also be provided during these periods. The problem areas listed below must be corrected within one year of notification.

7.2 RECOMMENDED MEASURES

The regular inspections and maintenance procedures presently conducted by the owner's representative appear to be adequate, although some form of documentation is needed. A thorough checklist should be compiled by the owner's representative and completed during each

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inspection. Maintenance items should be completed annually. Monitoring of the reservoir level should be expanded to include reservoir levels above normal pool.

A formal warning system and emergency action plan should be developed and put into operation as soon as possible. Monitor the seeps at regular intervals for turbidity and increase in flow. If increased flow from the seep area or turbidity is noted, a qualified geotechnical engineering firm should be retained to recommend remedial measures.

The following remedial measures must be completed within one year:

1. The far left bridge support must be underpinned and protected from future erosion.

2. The debris must be cleaned from the upstream side of the spillway.

3. The trees in the spillway discharge channel must be cut off at ground level.

4. Repair the spalled concrete on the spillway and dam.

5. Install a staff gage to monitor reservoir levels.

APPENDIX A

PHOTOGRAPHS

CONTENTS

Note: Photographs were taken on 6 March 1981

Photo 1. View of Left Downstream Half and Abutment of Dam
6 March 1981

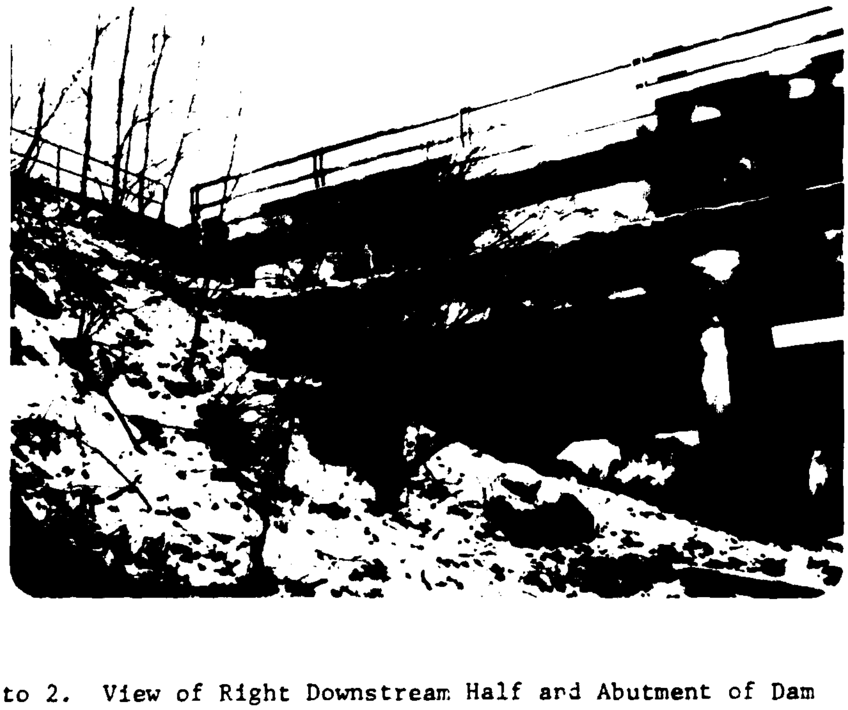


Photo 2. View of Right Downstream Half and Abutment of Dam
6 March 1981

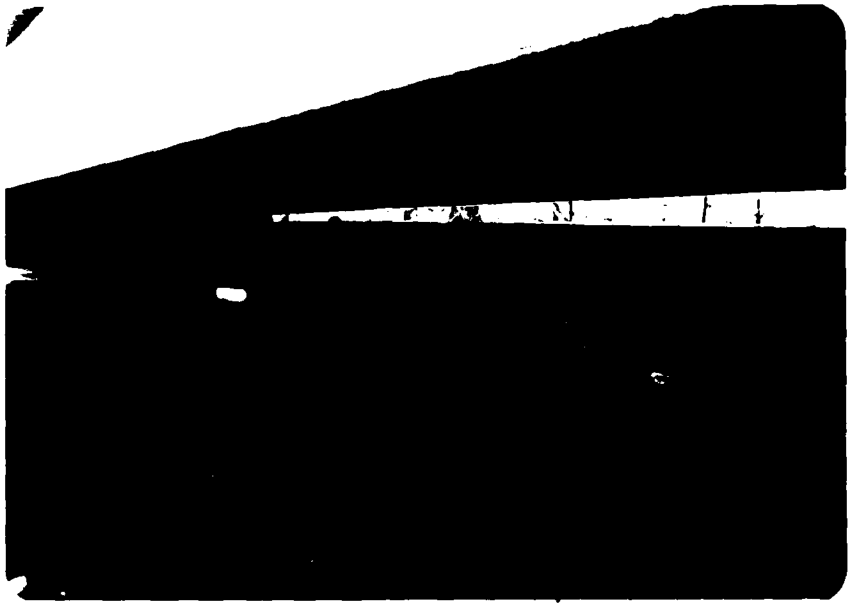


Photo 3. View of Upstream Face of Dam and Spillway Entrance
6 March 1981

Photo 4. View of Downstream Face of Dam and Spillway
6 March 1981

Photo 5. View of Upstream Side of Bridge
6 March 1981

Photo 6. View of Downstream Side of Bridge
6 March 1981

Photo 7. View of Right Downstream Buttress
6 March 1981

Photo 8. View of Small Masonry Dam Downstream
6 March 1981

APPENDIX B

VISUAL INSPECTION CHECKLIST

VISUAL INSPECTION CHECKLIST

1) Basic Data

a. General

Name of Dam Lake Peekskill Dam

Fed. I.D. # NY 87 DEC Dam No. 213C-814

River Basin Lower Hudson

Location: Town Lake Peekskill County Putnam

Stream Name Unnamed

Tributary of Peekskill Hollow Brook

Latitude (N) 41° 20.2' Longitude (W) 73° 52.8'

Type of Dam Concrete

Hazard Category High

Date(s) of Inspection 6 March 1981

Weather Conditions Cold, clear and 30° F.

Reservoir Level at Time of Inspection 291.5

b. Inspection Personnel James Ulinski, Anthony Klimek and Steve Lockington

c. Persons Contacted (Including Address & Phone No.)

Mr. A. Purdy

Lake Peekskill Improvement District

Box 317

Lake Peekskill, NY

d. History:

Date Constructed about 1928 Date(s) Reconstructed

Designer Allan Smith, P.E., Cold Spring, NY

Constructed By Unknown

Owner Village of Lake Peekskill, New York

2) <u>Embankment</u> - Not Applicable

a. Characteristics

(1) Embankment Material ______________________

____

(2) Cutoff Type ______________________

____

(3) Impervious Core ______________________

____

(4) Internal Drainage System ______________________

____

(5) Miscellaneous ______________________

____

b. Crest

(1) Vertical Alignment ______________________

____

(2) Horizontal Alignment ______________________

____

(3) Surface Cracks ______________________

____

(4) Miscellaneous ______________________

____

c. Upstream Slope

(1) Slope (Estimate) (V:H) ______________________

____

(2) Undesirable Growth or Debris, Animal Burrows ______________________

____

(3) Sloughing, Subsidence, or Depressions ______________________

____

____

(4) Slope Protection ______________________________

____

____

(5) Surface Cracks or Movement at Toe ___________________

____

d. Downstream Slope

(1) Slope (Estimate - V:H) ______________________

____

(2) Undesirable Growth or Debris, Animal Burrows ____________

____

____

(3) Sloughing, Subsidence or Depressions _________________

____

____

(4) Surface Cracks or Movement at Toe ___________________

____

(5) Seepage ______________________________________

____

____

(6) External Drainage System (Ditches, Trenches, Blanket) ________

____

____

(7) Condition Around Outlet Structure ___________________

____

(8) Seepage Beyond Toe ______________________________

e. Abutments - Embankment Contact ______________________________

(1) Erosion at Contact ______________________________

(2) Seepage Along Contact ______________________________

3) Drainage System

a. Description of System None

b. Condition of System Not applicable

c. Discharge from Drainage System Not applicable

4) Instrumentation (Monumentation/Surveys, Observation Wells, Weirs, Piezometers, Etc.) None

5) Reservoir

a. Slopes Slopes at reservoir are moderate and developed.

b. Sedimentation Sedimentation is not reported to be a problem.

c. Unusual Conditions Which Affect Dam None observed.

6) Area Downstream of Dam

a. Downstream Hazard (No. of Homes, Highways, etc.) Two homes and a road are located 1600 ft. downstream. Loss of life in homes is likely if the dam were to fail.

b. Seepage, Unusual Growth No unusual growth was observed. Seepage near right downstream buttress near spillway (0.5 gpm, estimated), seep (0.5 gpm) 2 ft. from far left bridge column support, small seeps on right side bottom. Erosion from storm sewer downstream of right abutment.

c. Evidence of Movement Beyond Toe of Dam None observed.

d. Condition of Downstream Channel The channel is narrow and steep with rock outcrops. Structure (8 ft. high and 51 ft. long) is 50 ft. downstream and is currently breached (non-impounding).

7) Spillway(s) (Including Discharge Conveyance Channel)

a. General The spillway consists of two 3 ft. high x 6 ft. wide (perpendicular to flow) openings which are 4 ft. wide (parallel to flow).

b. Condition of Service Spillway Spillway is in fair condition. Debris found at the spillway entrance and spillway bottom. Two 6 in. PVC pipes over spillway are used to siphon water from the lake. Spillway has minor spalling, ½-way up face.

c. Condition of Auxiliary Spillway None

d. Condition of Discharge Conveyance Channel Rock outcrops extend the length of the discharge channel. Debris and trees are located in the discharge channel.

8) Reservoir Drain/Outlet

Type: Pipe 2 Conduit ____ Other ____

Material: Concrete ____ Metal ____ Other PVC

Size: 6 inches Length ____

Invert Elevations: Entrance Unknown

Exit Unknown

Physical Condition (Describe): Unobservable

Material: PVC

Joints: ______ Alignment ______

Structural Integrity: ______

Hydraulic Capability: ______

Means of Control: Gate ______ Valve ______ Uncontrolled ______

Operation: Operable X Inoperable ______ Other ______

Present Condition (Describe): Used to syphon water from the reservoir in fall. Takes one month to lower the reservoir 5 ft. Broken in places. A 24 in. outlet pipe was plugged with concrete in 1948.

9) Structural

a. Concrete Surfaces Abandoned bridge deck (top of dam) is spalled. Right downstream buttress is seeping through deteriorated concrete. Far left downstream bridge (abandoned) support is undermined.

b. Structural Cracking No major cracking.

c. Movement - Horizontal & Vertical Alignment (Settlement) None observed.

d. Junctions with Abutments or Embankments No problems observed.

e. Drains - Foundation, Joint, Face None observed.

f. Water Passages, Conduits, Sluices None observed.

g. Seepage or Leakage Seepage exists near right downstream buttress near spillway and 2 ft. from far left bridge column. The seepage is estimated at 0.5 gpm. The owner's representative reported seeing seepage exiting the right toe area near the spillway. The inspection team did not observe this seepage because of the amount of debris at this location.

h. Joints - Construction, etc. No problems observed.

i. Foundation The dam is estimated to be founded on tight, high RQD gneissic rock.

j. Abutments No problems observed.

k. Control Gates None

l. Approach & Outlet Channels Good Condition

m. Energy Dissipators (Plunge Pool, etc.) None

n. Intake Structures None

o. Stability No signs of instability were noted during the visual inspection.

p. Miscellaneous

10) Appurtenant Structures (Power House, Lock, Gatehouse, Other)

a. Description and Condition None

APPENDIX C

HYDROLOGIC/HYDRAULIC DATA AND COMPUTATIONS

MICHAEL BAKER, JR., INC.
THE BAKER ENGINEERS

Box 280
Beaver, Pa. 15009

Subject LAKE PEEKSKILL DAM
APPENDIX C

S.O. No. ______
Sheet No. ______ of ______
Drawing No. ______
Computed by ______ Checked by ______ Date ______

TABLE OF CONTENTS

CHECK LIST FOR DAMS
HYDROLOGIC AND HYDRAULIC
ENGINEERING DATA

AREA-CAPACITY DATA:

		Elevation (ft.)	Surface Area (acres)	Storage Capacity (acre-ft.)
1)	Top of Dam	295.6	67	1,357
2)	Design High Water (Max. Design Pool)	Unknown	--	--
3)	Auxiliary Spillway Crest	None	--	--
4)	Pool Level with Flashboards	N/A	--	--
5)	Service Spillway Crest	N/A	--	1,074

DISCHARGES

		Volume (cfs)
1)	Average Daily	Unknown
2)	Spillway @ Maximum High Water - Top of Dam -	589
3)	Spillway @ Design High Water	Unknown
4)	Spillway @ Auxiliary Spillway Crest Elevation	N/A
5)	Low Level Outlet	N/A
6)	Total (of all facilities) @ Maximum High Water	589
7)	Maximum Known Flood	Unknown
8)	At Time of Inspection	15

CREST: ELEVATION: 295.6 ft.

Type: Concrete (two 3' X 6' openings)

Width: 16 ft. (abandoned bridge deck) Length: 120 ft.

Spillover Broad-crested weir

Location Spillway is located 25 ft. from left abutment

SPILLWAY:

SERVICE		AUXILIARY
291.0	Elevation	None
Two broad-crested weirs	Type	--
4 ft. ea.	Width	--
	Type of Control	
Uncontrolled	Uncontrolled	--
	Controlled:	
--	Type (Flashboards; gate)	--
--	Number	--
--	Size/Length	--
	Invert Material	--
	Anticipated Length of Operating Service	--
Approximately 12 ft.	Chute Length	--
11 ft.	Height Between Spillway Crest & Approach Channel Invert (Weir Flow)	--

HYDROMETEROLOGICAL GAGES:

Type: None

Location:

Records:

Date:

Max. Reading:

FLOOD WATER CONTROL SYSTEM:

Warning System: None

Method of Controlled Releases (mechanisms):

None

DRAINAGE AREA: 0.60 sq. mi. (386 acres)

DRAINAGE BASIN RUNOFF CHARACTERISTICS:

Land Use - Type: Forests and lake development

Terrain - Relief: Moderate slopes

Surface - Soil: Well-drained

Runoff Potential (existing or planned extensive alterations to existing surface or subsurface conditions)

No known plans to change runoff patterns at time of inspection.

Potential Sedimentation problem areas (natural or man-made; present or future)

No problem areas observed. Slopes were developed or well vegetated.

Potential Backwater problem areas for levels at maximum storage capacity including surcharge storage:

Flooding of homes on the lake shoreline could occur.

Dikes - Floodwalls (overflow & non-overflow) - Low reaches along the Reservoir perimeter:

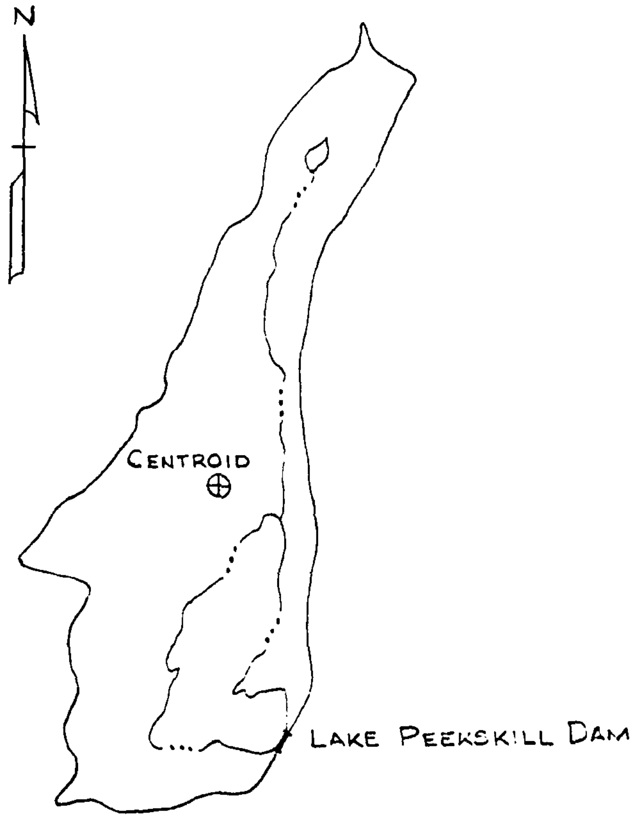
Location: None

Elevation:

Reservoir:

Length @ Maximum Pool 3,400 ft.

Length of Shoreline (@ Spillway Crest) 8,800 ft. (1.67 mi.)



QUAD : PEEKSKILL, N.Y.
DRAINAGE AREA = 0.60 SQ. MI.

DRAINAGE AREA ABOVE
LAKE PEEKSKILL DAM

SCALE : 1 IN. = 2000 FT.

HYDROLOGIC AND HYDRAULIC DATA

DRAINAGE AREA ABOVE DAM = 4.21 SQ. IN. (MEASURED ON PEEKSKILL, N.Y. QUAD) = 0.604 SQ. MI.

L_{CA} = 3700 FT = 0.70 MI.

L = 9300 FT = 1.76 MI.

STORAGE COMPUTATIONS

SURFACE AREA VS. ELEVATION MEASUREMENTS (TAKEN FROM QUAD)

ELEVATION (FT)	AREA (ACRES)
291	58.16
300	72.24
320	88.77
340	112.64

NOTE: NORMAL POOL ASSUMED TO BE ELEV. 291 (LISTED ON QUAD)

$C_p = 0.63 \qquad C_T = 2.0$

$T_p = C_T (L \times L_{CA})^{.3}$

$= 2.0 (1.76 \times 0.70)^{.3}$

$T_p = 2.13$

ADJUSTMENT FOR DURATION

$T_R = T_p / 5.5 = 2.13/5.5 = 0.39$ HR USED 0.33 HR. INTERVAL.

$T_{PR} = T_p + \frac{T_R - T_R}{4}$

$= 2.13 + \frac{.39 - .33}{4}$

$T_{PR} = 2.14$ HR

MICHAEL BAKER, JR., INC.
THE BAKER ENGINEERS

Box 280
Beaver, Pa. 15009

Subject LAKE PEEKSKILL DAM S.O. No.
Sheet No. 7 of 18
Drawing No.
Computed by SML Checked by GWT Date 3/12/81

SURFACE AREA RESERVOIR BOTTOM

SURFACE AREA EL. 291 58.16 ACRES

EQUIVALENT CIRCLE RADIUS r = 898.01 FT ✓

AVERAGE SIDE SLOPE S = 5.39 H:V

AVERAGE RESERVOIR DEPTH D = 21 FT (FROM MAINTENANCE FORMAN)

RADIUS BOTTOM OF RESERVOIR

898.01 − 21(5.39) = 784.82 FT ✓

SURFACE AREA BOTTOM 44.42 ACRES ✓

RAINFALL DATA (FROM HMR-33)

DAM AND DRAINAGE AREA ARE IN ZONE 1

PMP (24 HR)$_{200\,mi^2}$ = 21.3 IN.

DRAINAGE AREA = 0.604 SQ. MI.

PMP (6-HR) = 111% PMP (24-HR)$_{200\,mi^2}$
" (12 HR) = 123% " " "
" (24 HR) = 133% " " "
" (48 HR) = 142% " " "

100-YEAR, 24 HR RAINFALL (FROM TP-40) = 7.8 IN.
" " 12 HR " " " = 6.5 IN.
" " 6 HR " " " = 5.3 IN.

MICHAEL BAKER, JR., INC.
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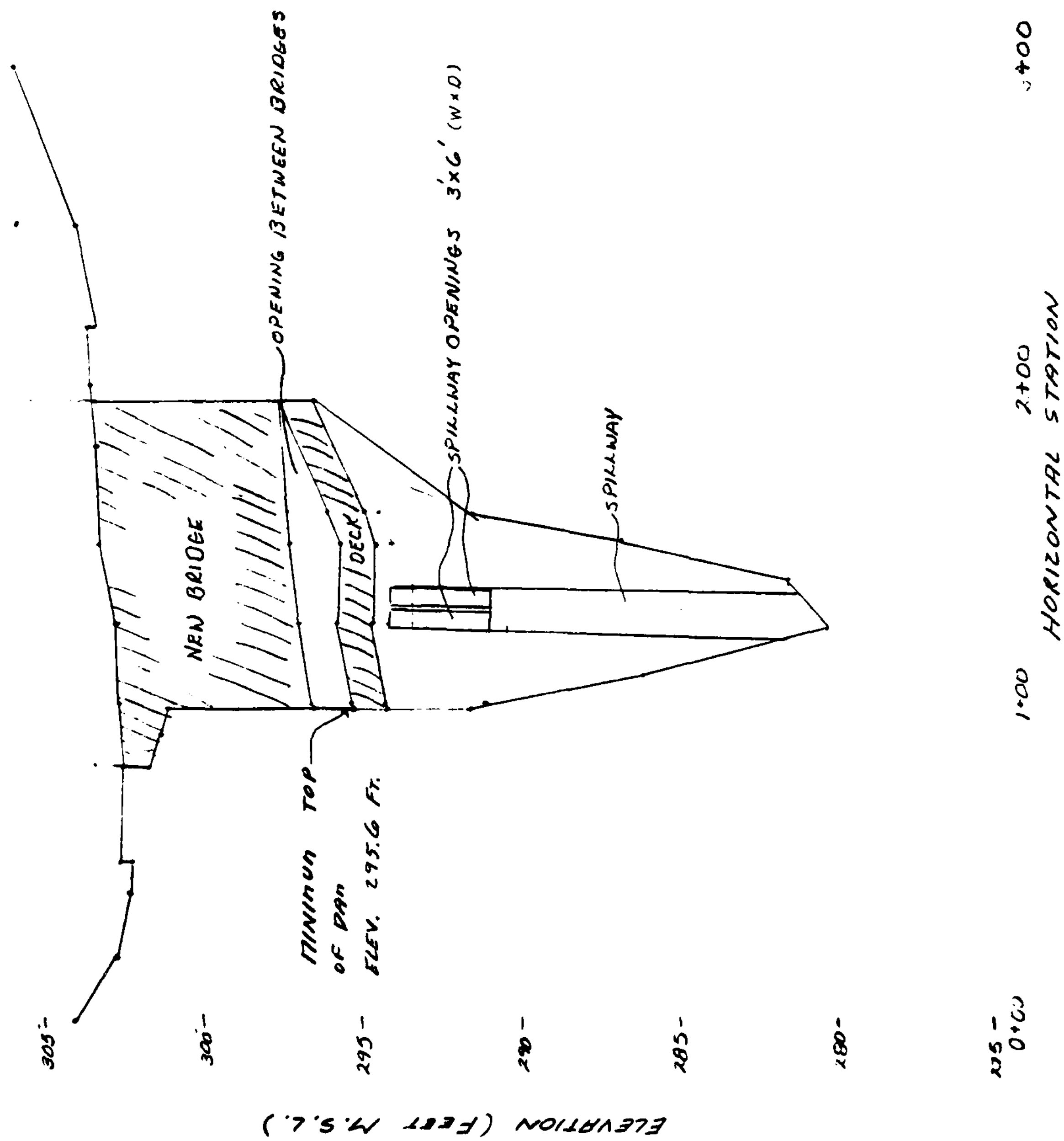
Beaver, Pa. 15009

Subject: LAKE PEEKSKILL DAM — S.O. No. ____
PROFILE TOP OF DAM — Sheet No. 9 of 12
Drawing No. ____
Computed by: SML — Checked by: GWT — Date: 3/11/81



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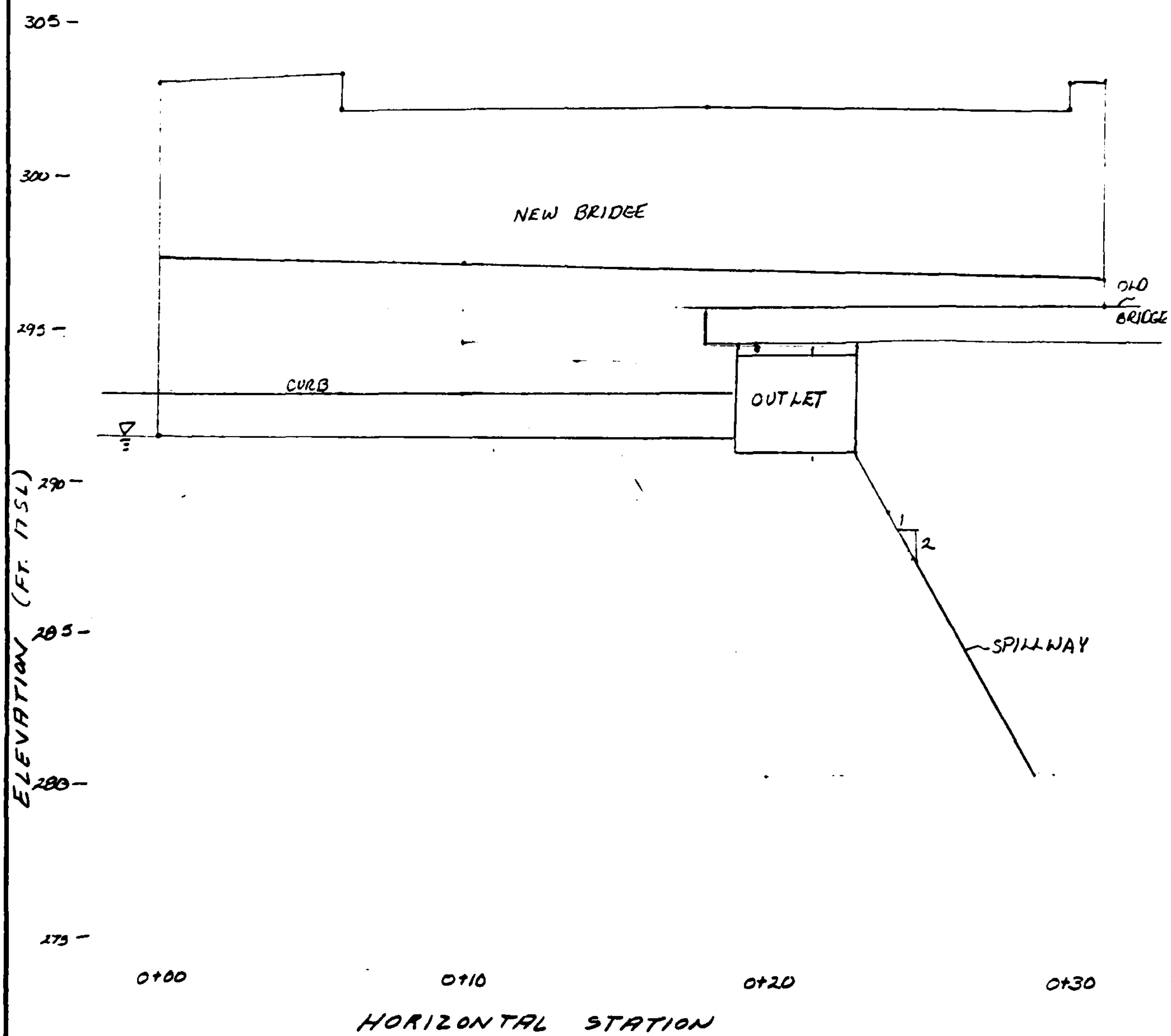
Subject: LAKE PEEKSKILL DAM
CROSS SECTION AT STA. 1+2.5

S.O. No.
Sheet No. 10 of 15
Drawing No.

Computed by SML   Checked by GWT   Date 3/8/81



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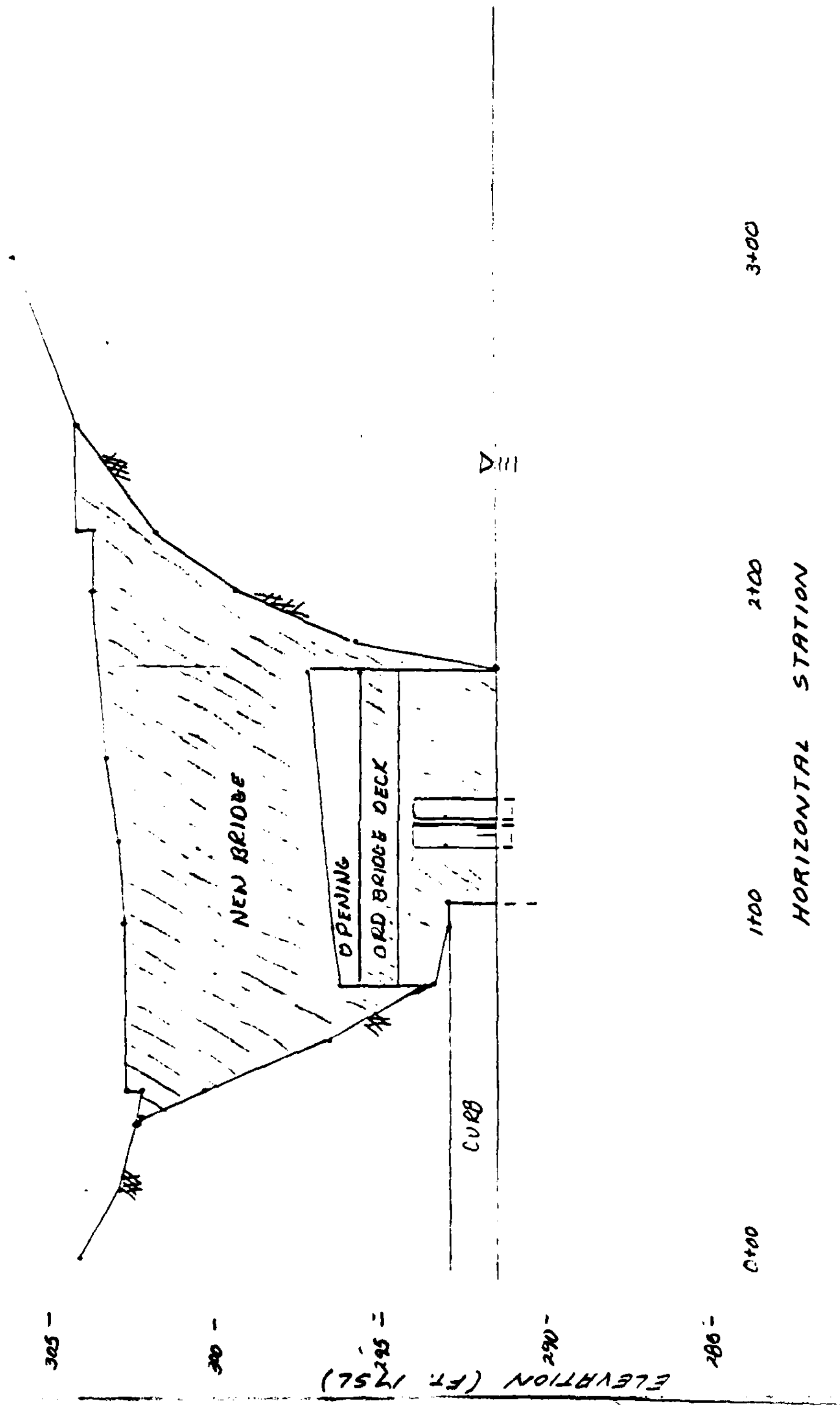
Beaver, Pa. 15009

Subject: LAKE PEEKSKILL DAM
UPSTREAM PROFILE
S.O. No. ______
Sheet No. 11 of 13
Drawing No. ______
Computed by: SML Checked by: GWT Date: 3/11/81



MICHAEL BAKER, JR., INC.
THE BAKER ENGINEERS
Box 280
Beaver, Pa. 15009

Subject LAKE PEEKSKILL DAM S.O. No. ____
SPILLWAY AND COMBINED RATING CURVES Sheet No. 12 of 12
Drawing No. ____
Computed by SHL Checked by GWT Date 5/20/81

THE TWO 3 FT x 6 FT OUTLETS WERE ASSUMED TO BE BROAD CRESTED WEIRS [illegible] THE THE TOP OF DAM. FOR WEIR FLOW THE EQUATION IS

$$Q = CLH^{3/2}$$

WHEN THE LAKE SURFACE SEALS THE TOP OF THE CULVERT THEN THE FLOW BECOMES ORFICE FLOW. THE EQUATION BECOMES

$$Q = CA\sqrt{2gH}$$

BETWEEN THE OLD DAM AND THE NEW BRIDGE AN AVERAGE WIDTH OF 1.5 FT [illegible] AN AVERAGE LENGTH OF 72' WAS USED.

	2 - 3'x6' OUTLETS				TOP OF OLD DAM				
ELL.	TYPE OF FLOW	C	H (FT)	Q (CFS)	TYPE OF FLOW	C	H (FT)	Q (CFS)	COMBINED FLOW CFS
291	NONE	NA	NA	0	NONE	NA	NA	NA	0
291.6	WEIR	2.69	0.6	15.	"	"	"	"	15.
292	"	2.67	1.0	32.	"	"	"	"	32
293	"	2.68	2.0	91.	"	"	"	"	91
293.5	"	2.72	2.5	129	"	"	"	"	129
293.9	WEIR	2.73	2.9	162	"	"	"	"	162
295.0	ORIFICE	0.61	2.5	279	WEIR	2.65	1.0	244	523
296.60	"	"	4.10	357	ORIFICE	0.61	0.40	342	699
297.5	"	"	5.0	394	"	"	1.3	616	1010
298.5	"	"	6.0	432	"	"	2.3	820	1252
300.5	"	"	8.0	498	"	"	4.3	1121	1619
302.5	ORIFICE	0.61	10	557	ORIFICE	0.61	6.3	1356	1913

WEIR COEFFICIENTS KING + BRATER P 5-40 TABLE 5-3

ORIFICE COEFFICIENTS KING + BRATER P 4-31 TABLE 4-5

MICHAEL BAKER, JR., INC.
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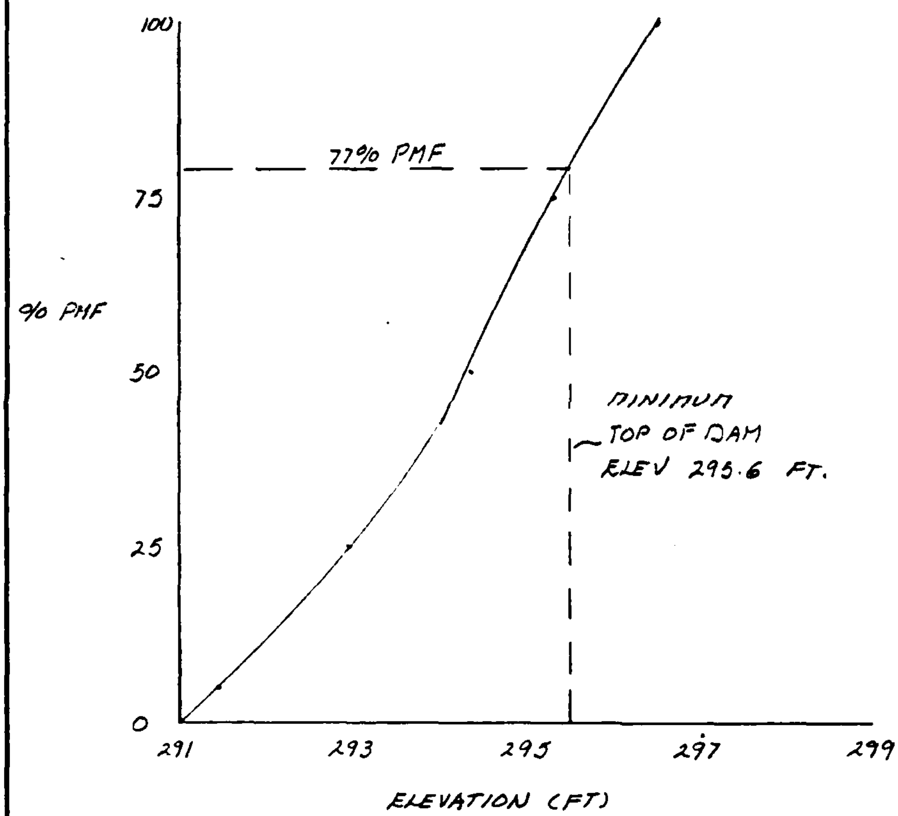
Box 280
Beaver, Pa. 15009

Subject LAKE PEEKSKILL DAM
SPILLWAY CAPACITY ANALYSIS
S.O. No.
Sheet No. 13 of 13
Drawing No.
Computed by SML Checked by GWT Date 3/16/81



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***********************************
FLOOD HYDROGRAPH PACKAGE (HEC-1)
DAM SAFETY VERSION        JULY 1978
  LAST MODIFICATION  26 FEB 79
  MBJ UPDATE          04 JUN 79
***********************************
  1          A1     NATIONAL PROGRAM FOR INSPECTION OF NON-FEDERAL DAMS
  2          A2     HYDROLOGIC AND HYDRAULIC ANALYSIS OF LAKE PEEKSKILL DAM
  3          A3     UNIT HYDROGRAPH BY SNYDERS METHOD
  4          B    300       0      20       0       0       0       0       0      -4       0
  5          B1     5
  6          J      1       5       1
  7          J1   1.0    0.75    0.50    0.25    0.05
  8          K      0       1                                       1
  9          K1     RUNOFF HYDROGRAPH TO DAM
 10          M      1       1    0.60
 11          P           21.5     111     123     133     142
 12          T                                                    1.0    0.10
 13          W   2.15    0.55
 14          X   -1.5   -0.05     2.0
 15          K      1       2                                       1
 16          K1     ROUTING FOR LAKE PEEKSKILL DAM
 17          Y                              1       1
 18          Y1     1                                            -291      -1
 19          Y4  291.   291.5    292.    293.   293.5   294.7    295.   296.6   297.5   298.5
 20          Y4 300.5   302.5
 21          Y5     0      15      32      91     127     162     523     659    1010    1252
 22          Y5  1617    1915
 23          $A 44.42   58.15   72.24   86.77  112.64
 24          $E  275.    291.    300.    325.    345.
 25          $$  291.
 26          $D 295.5
 27          K     99
```

SHEET 14 of 18

```
**********************************
FLOOD HYDROGRAPH PACKAGE (HEC-1)
DAM SAFETY VERSION       JULY 1978
  LAST MODIFICATION  26 FEB 79
  MOD UPDATE         04 JUN 79
**********************************

RUN DATE 03/13/81
    TIME    03.53

          NATIONAL PROGRAM FOR INSPECTION OF NON-FEDERAL DAMS
          HYDROLOGIC AND HYDRAULIC ANALYSIS OF LAKE PEEKSKILL DAM
          UNIT HYDROGRAPH BY SNYDERS METHOD

                              JOB SPECIFICATION
   NQ    NHR   NMIN   IDAY    IHR   IMIN  METRC   IPLT   IPRT  NSTAN
  300      0     20      0      0      0      0      0     -4      0
                      JOPER    NWT  LROPT  TRACE
                          5      0      0      0      0

                    MULTI-PLAN ANALYSES TO BE PERFORMED
                       NPLAN= 1 NRTIO= 5 LRTIO= 1
       RTIOS=   1.00   0.75   0.50   0.25   0.05

**********      **********      **********      **********      **********

                        SUB-AREA RUNOFF COMPUTATION

       RUNOFF HYDROGRAPH TO DAM

             ISTAQ  ICOMP  IECON  ITAPE   JPLT   JPRT  INAME ISTAGE  IAUTO
                 1      0      0      0      0      0      1      0      0

                               HYDROGRAPH DATA
    IHYDG  IUHG  TAREA   SNAP  TRSDA  TRSPC  RATIO  ISNOW  ISAME  LOCAL
        1     1   0.80    0.0   0.80    0.0    0.0      0      0      0

                                 PRECIP DATA
             SPFE    PMS     R6    R12    R24    R48    R72    R96
              0.0  21.50 111.00 123.00 133.00 142.00    0.0    0.0
TRSPC COMPUTED BY THE PROGRAM IS 0.800

                                  LOSS DATA
   LROPT  STRKR  DLTKR  RTIOL  ERAIN  STRKS  RTIOK  STRTL  CNSTL  ALSMX  RTIMP
       0    0.0    0.0   1.00    0.0    0.0   1.00   1.00   0.10    0.0    0.0

                            UNIT HYDROGRAPH DATA
                        TP=  2.13   CP=0.63    NTA=  0

                               RECESSION DATA
                 STRTQ=   -1.50    QRCSN=   -0.05    RTIOR= 2.00

     UNIT HYDROGRAPH 33 END-OF-PERIOD ORDINATES, LAG=  2.14 HOURS, CP= 0.64  VOL= 1.00
      5.     24.     47.     73.     96.    111.    116.    109.     93.     76.
     66.     55.     46.     39.     33.     27.     23.     19.     16.     14.
     11.     10.      8.      7.      6.      5.      4.      3.      3.      2.
      2.      2.      1.      1.      1.
```

SHEET 15 OF 18

END-OF-PERIOD FLOW

MO.DA	HR.MN	PERIOD	RAIN	EXCS	LOSS	COMP Q	MO.DA	HR.MN	PERIOD	RAIN	EXCS	LOSS	COMP Q
									SUM	24.20	20.47	[illegible]	[illegible]
										([illegible])	([illegible])	([illegible])	([illegible])

********** ********** ********** ********** **********

HYDROGRAPH ROUTING

ROUTING FOR LAKE PEEKSKILL DAM

ISTAQ	ICOMP	IECON	ITAPE	JPLT	JPRT	INAME	ISTAGE	IAUTO
2	1	0	0	0	0	1	0	0

ROUTING DATA

QLOSS	CLOSS	AVG	IRES	ISAME	IOPT	IPMP	LSTR
0.0	0.0	0.0	1	1	0	0	0

NSTPS	NSTDL	LAG	AMSKK	X	TSK	STORA	ISPRAT
1	0	0	0.0	0.0	0.0	-291.	-1

STAGE	291.00	291.50	292.00	293.00	293.50	293.90	295.00	296.80	[illegible]	[illegible]
	300.50	302.50								
FLOW	0.0	15.00	32.00	91.00	129.00	162.00	523.00	[illegible]	[illegible]	[illegible]
	1619.00	1713.00								

SURFACE AREA=	44.	58.	72.	89.	115.
CAPACITY=	0.	1074.	1660.	3267.	5273.
ELEVATION=	270.	291.	300.	320.	340.

CREL	SPWID	COQW	EXPW	ELEVL	COOL	CAREA	EXPL
291.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

DAM DATA

TOPEL	COQD	EXPD	DAMWID
295.6	0.0	0.0	0.

PEAK OUTFLOW IS 693. AT TIME 44.33 HOURS

PEAK OUTFLOW IS 559. AT TIME 45.00 HOURS

PEAK OUTFLOW IS 316. AT TIME 44.33 HOURS

PEAK OUTFLOW IS 38. AT TIME 45.67 HOURS

PEAK OUTFLOW IS 11. AT TIME 46.67 HOURS

SHEET 16 OF 18

********** ********** ********** ********** **********

PEAK FLOW AND STORAGE (END OF PERIOD) SUMMARY FOR MULTIPLE PLAN-RATIO ECONOMIC COMPUTATIONS
FLOWS IN CUBIC FEET PER SECOND (CUBIC METERS PER SECOND)
AREA IN SQUARE MILES (SQUARE KILOMETERS)

OPERATION	STATION	AREA	PLAN	RATIOS APPLIED TO FLOWS				
				RATIO 1	RATIO 2	RATIO 3	RATIO 4	RATIO 5
				1.00	0.75	0.50	0.25	0.05
HYDROGRAPH AT	1	0.60	1	1385.	1038.	692.	346.	69.
	(	1.55)	(	39.21)(	29.40)(	19.60)(	9.80)(	1.96)(
ROUTED TO	2	0.60	1	693.	559.	310.	88.	11.
	(	1.55)	(	19.62)(	15.84)(	8.78)(	2.49)(	0.31)(

Sheet 17 of 18

SUMMARY OF DAM SAFETY ANALYSIS

PLAN 1 ....

	INITIAL VALUE	SPILLWAY CREST	TOP OF DAM
ELEVATION	291.00	291.00	295.00
STORAGE	1074.	1074.	1557.
OUTFLOW	0.	0.	303.

RATIO OF PMF	MAXIMUM RESERVOIR W.S.ELEV	MAXIMUM DEPTH OVER DAM	MAXIMUM STORAGE AC-FT	MAXIMUM OUTFLOW CFS	DURATION OVER TOP HOURS	TIME OF MAX OUTFLOW HOURS	TIME OF FAILURE HOURS
1.00	295.54	0.54	1620.	675.	4.67	44.33	0.00
0.75	295.33	0.0	1540.	557.	0.0	44.00	0.00
0.50	294.37	0.0	1278.	515.	0.0	44.33	0.00
0.25	292.96	0.0	1190.	33.	0.0	45.67	0.00
0.05	291.45	0.0	1099.	11.	0.0	46.67	0.00

SHEET 18 OF 18

APPENDIX D

REFERENCES

REFERENCES

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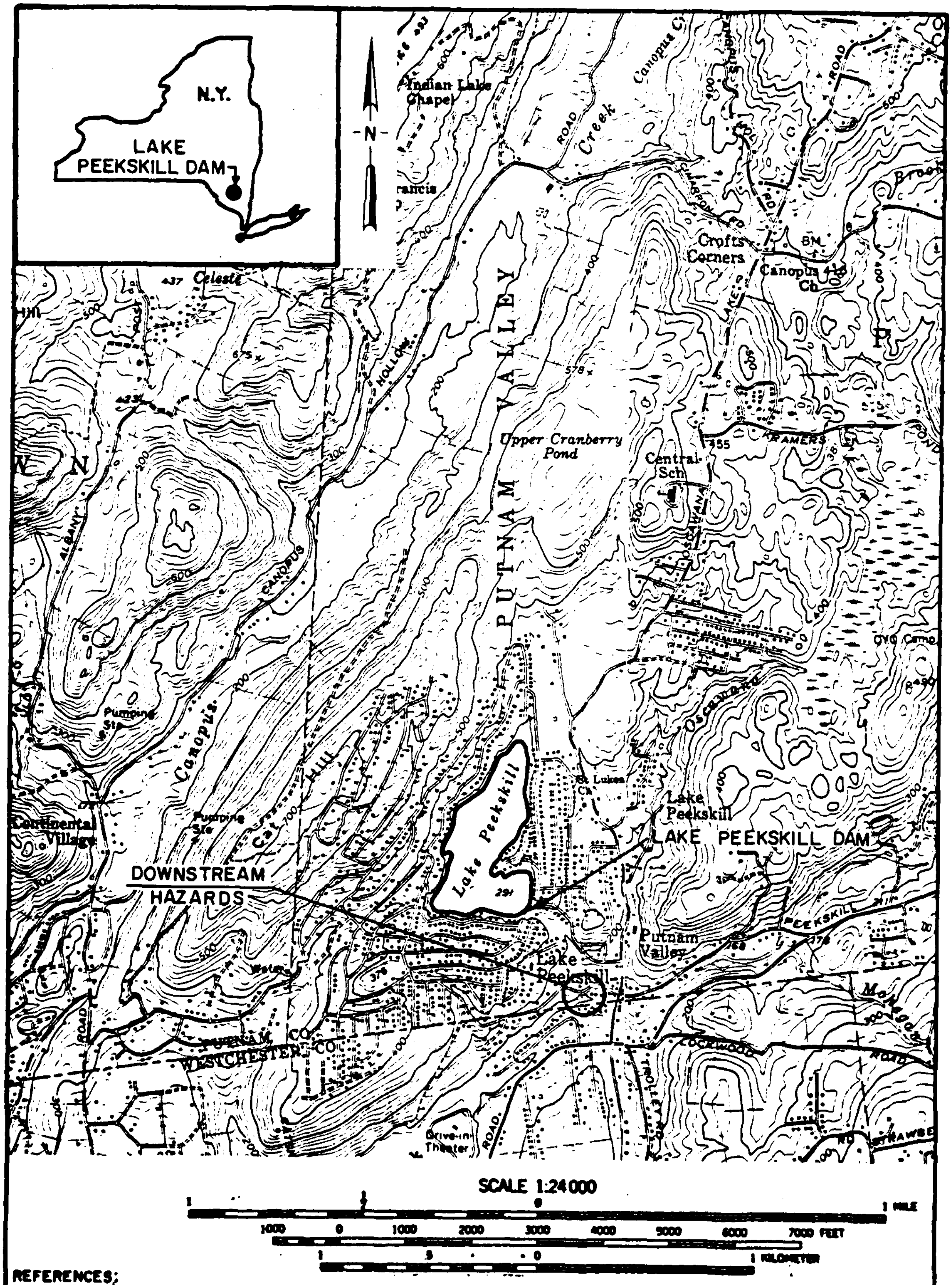
APPENDIX E

DRAWINGS

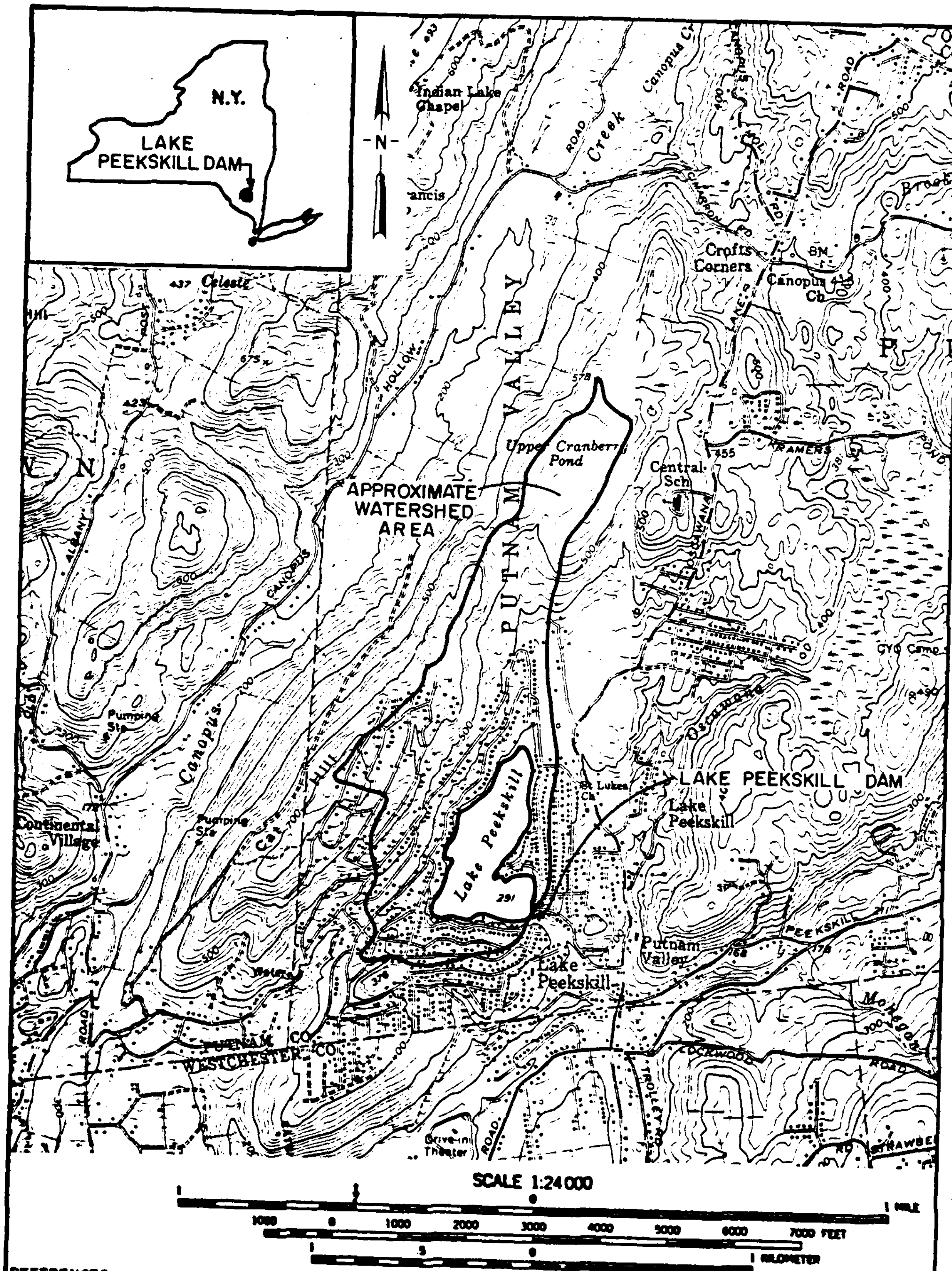
CONTENTS



REFERENCES;
1. U.S.G.S. 7.5' PEEKSKILL, N.Y. QUADRANGLE. 1957
2. U.S.G.S. 7.5' MOHEGAN LAKE, N.Y. QUADRANGLE. 1956

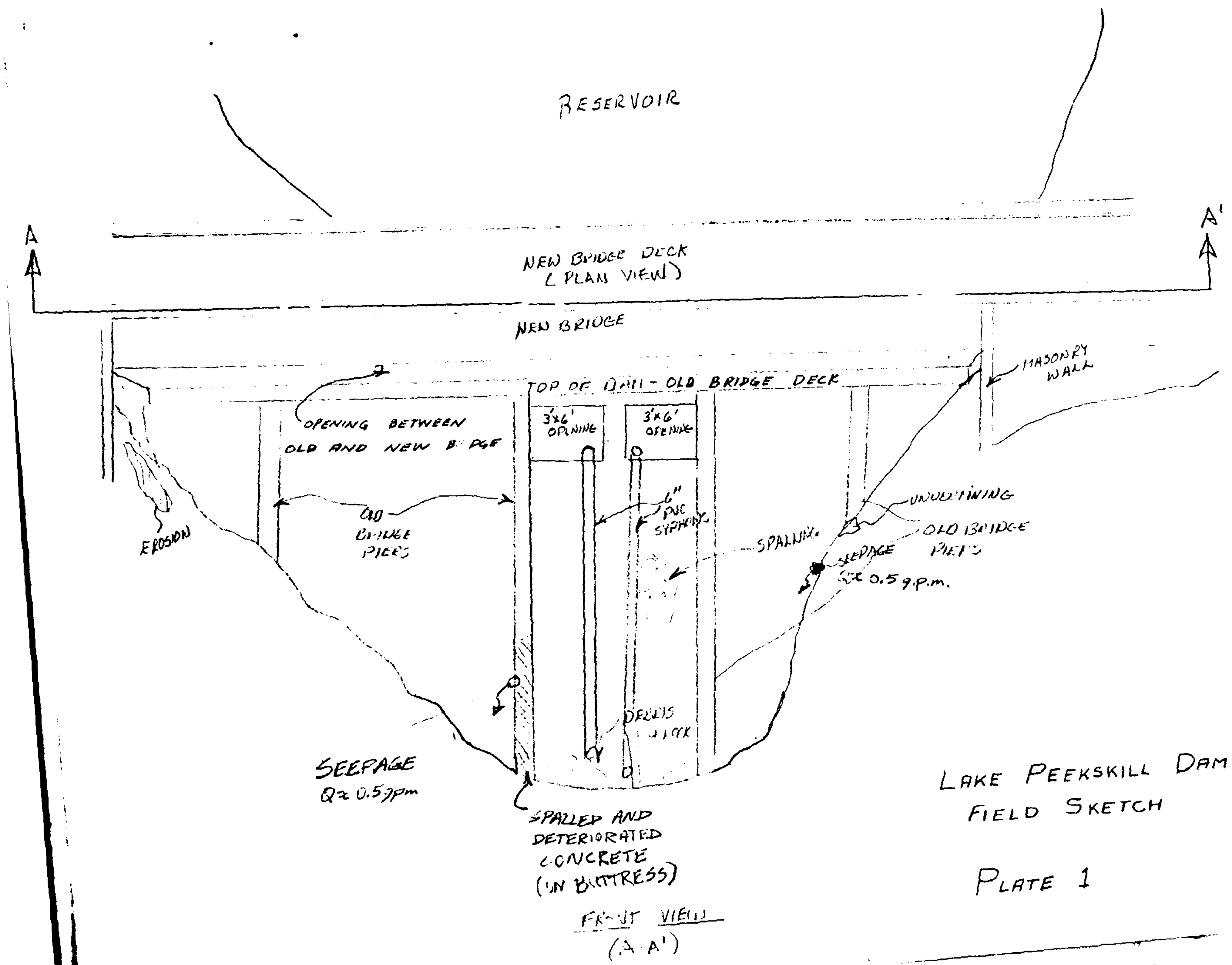
LOCATION PLAN

LAKE PEEKSKILL DAM



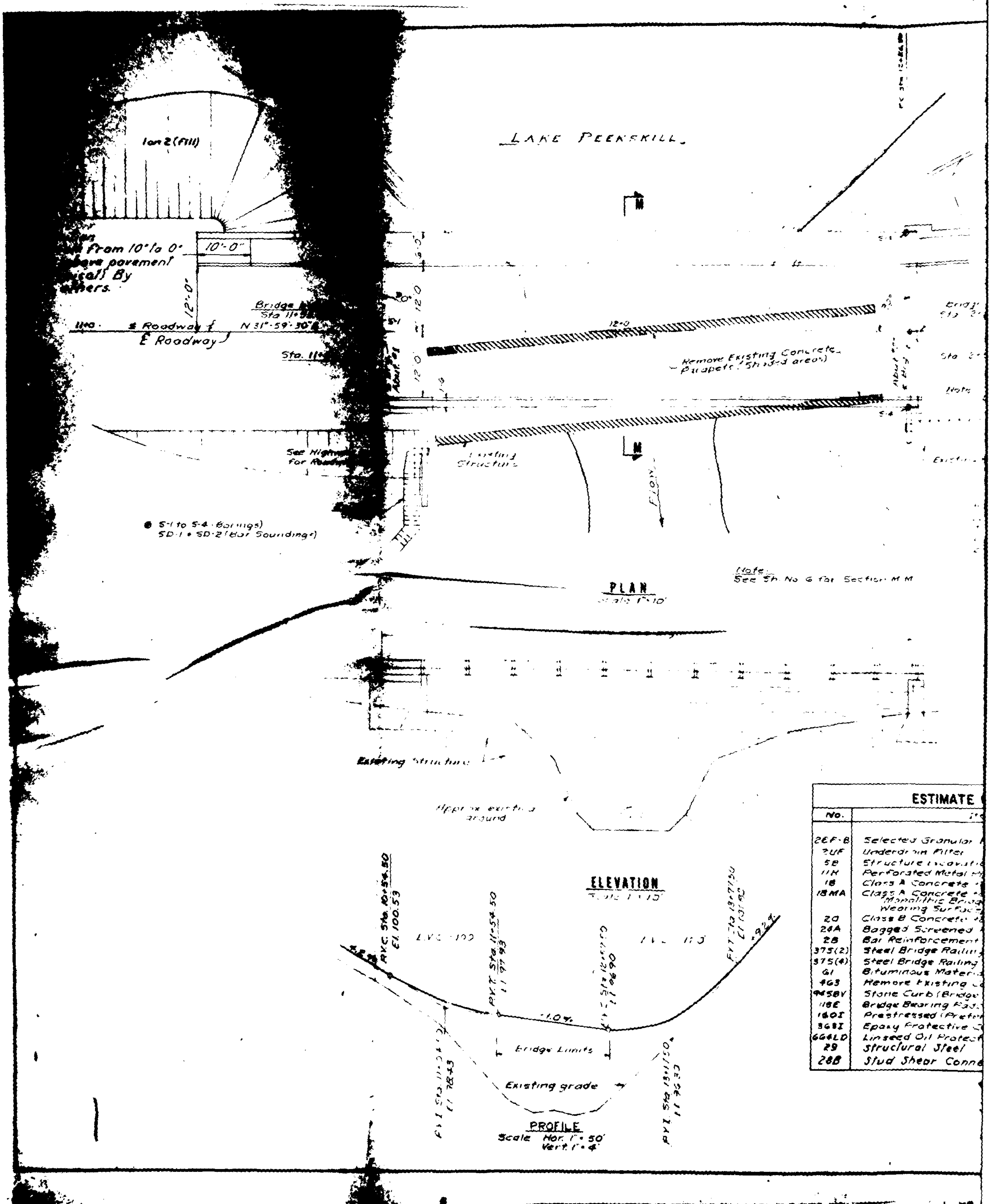
REFERENCES:
1. U.S.G.S. 7.5' PEEKSKILL, N.Y. QUADRANGLE. 1957
2. U.S.G.S. 7.5' MOHEGAN LAKE, N.Y. QUADRANGLE. 1956

WATERSHED MAP
LAKE PEEKSKILL DAM

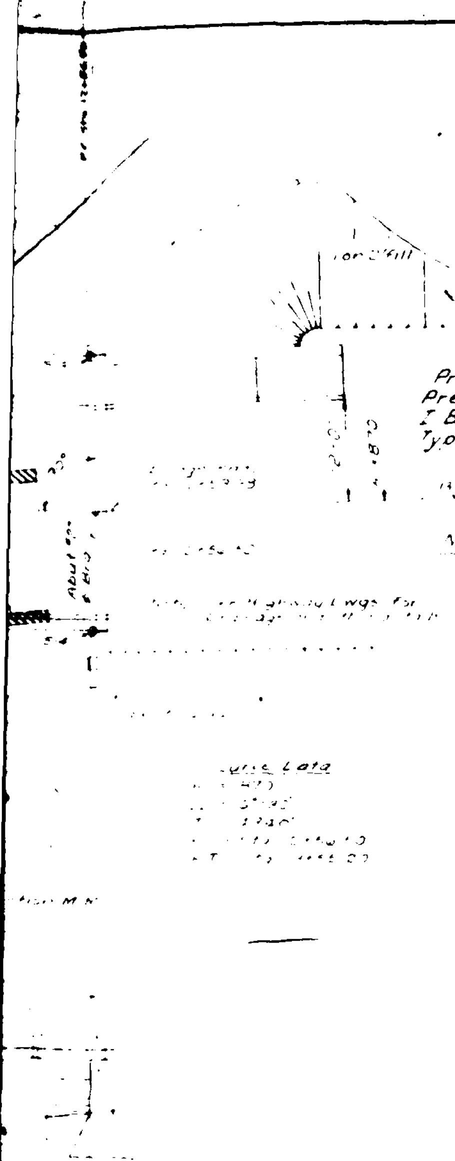


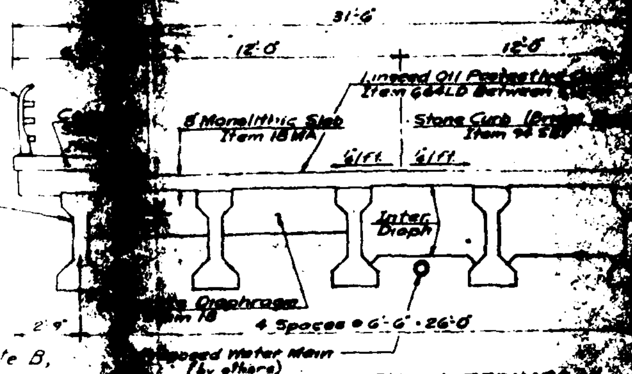
LAKE PEEKSKILL DAM
FIELD SKETCH

PLATE 1


LAKE PEEKSKILL
1 on 2 (Fill)
from 10' to 0'
above pavement
By
Others.
10'-0"
12'-0"
Bridge
N 31°-59'-30"
℄ Roadway
Sta. 11+
12'-0
Remove Existing Concrete Parapets (Shaded area)
Existing Structure
See High
for Road
Flow
● S-1 to S-4 (Borings)
SD-1 & SD-2 (Bar Soundings)
PLAN
Note:
See Sh. No. 6 for Section M-M
Existing Structure
Approx. existing ground
ELEVATION
ESTIMATE
No.
2EF-B Selected Granular
2UF Underdrain Filter
5B Structure Excavati
11R Perforated Metal
18 Class A Concrete
18MA Class A Concrete Monolithic Brid Wearing Surfac
20 Class B Concrete
24A Bagged Screened
28 Bar Reinforcement
375(2) Steel Bridge Railin
375(4) Steel Bridge Railing
61 Bituminous Mater
463 Remove Existing
945BV Stone Curb (Bridge
118E Bridge Bearing
160I Prestressed (Pret
568I Epoxy Protective
664LD Linseed Oil Protect
29 Structural Steel
288 Stud Shear Conne
P.V.C. Sta. 10+54.50
El. 100.53
P.V.T. Sta. 11+54.50
-1.0%
Bridge Limits
Existing grade
PROFILE
Scale Hor. 1" = 50'
Vert. 1" = 4'

TOWN OF PUTN





TYPICAL BRIDGE SECTION-ALTERNATE
Scale 1/4"=1'-0"

GENERAL NOTES

MATERIALS SPECIFICATIONS:

New ... State Department of Public Works Specifications ... 1962 ... current modifications and additions.

DESIGN:

AASHO ... Standard Specifications for Highway Bridges ... New ... State Department of Public Works ... Design ... Bridge Structures.

CONCRETE

To in... after... shall... Beams have ... beams of the bearing ... camber is indicated on the plans ... With Haunches: The depth of ... be computed in the field by ... the stakeout survey, to place ... grade. The elevations and ... the depth of the haunches ... Engineer for approval.

... bars shall be lapped a minimum of ... more than 12 inches of concrete ... lapped a minimum of 30 diameters ... on which asbestos sheet ... steel trowel finished.

... SUPERSTRUCTURE:

... A: Prestressed, Pretensioned ... in composite action with rein... Alternate B: Structural Steel Beams ... concrete slab.

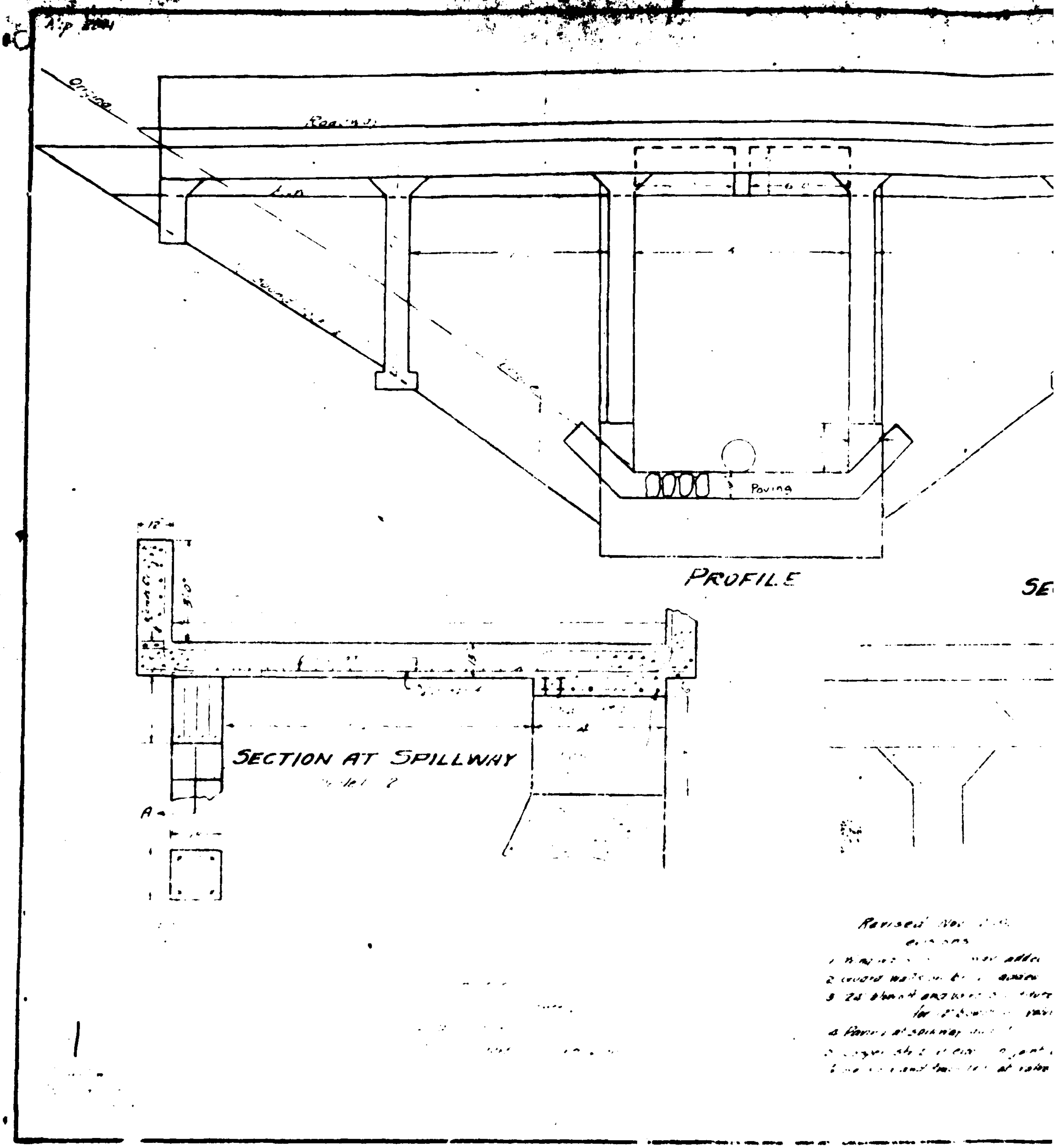
LIST OF BRIDGE DRAWINGS

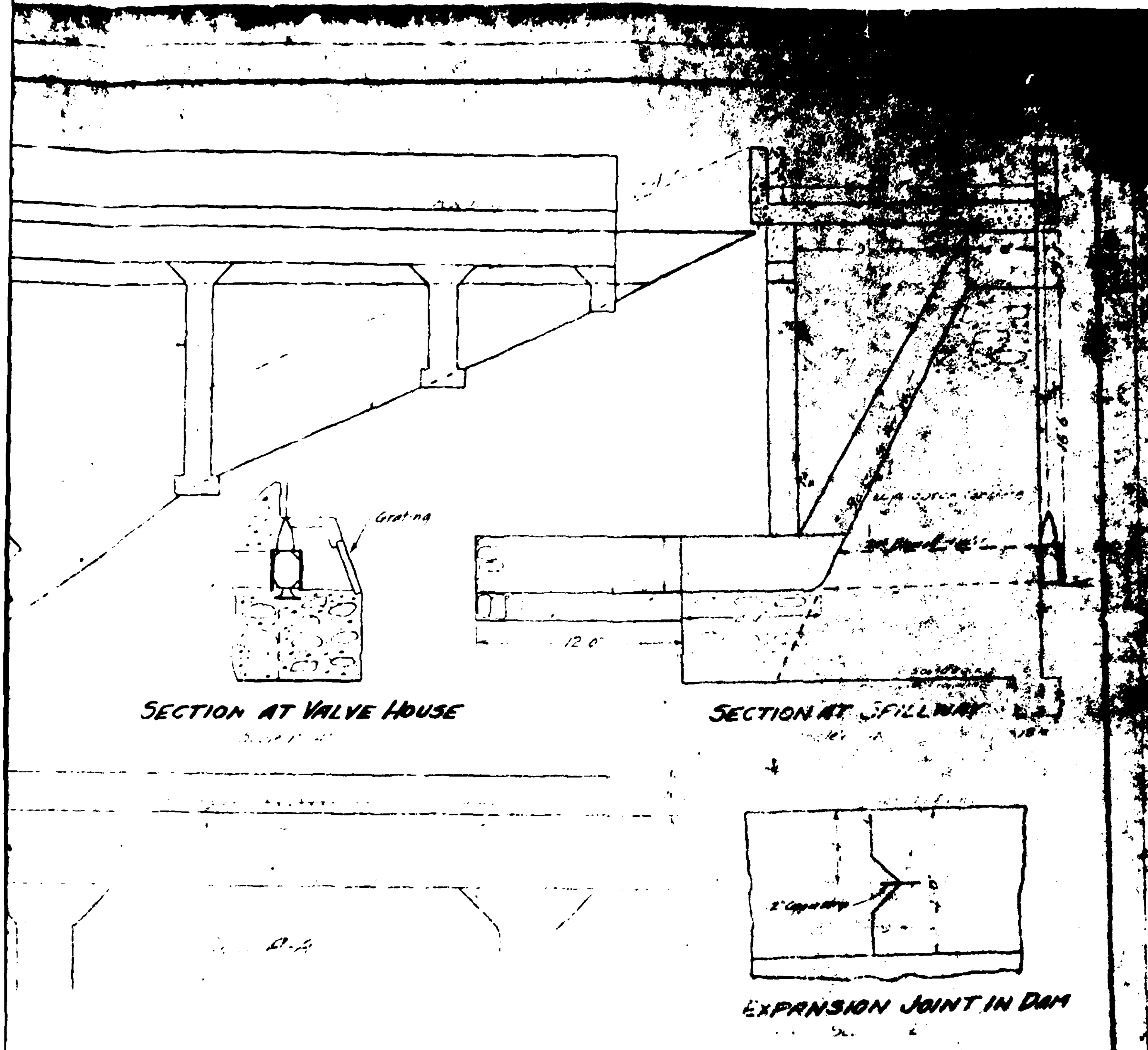
General Plan
Abutment No. 1-Details
Abutment No. 2-Details
... Plan-Concrete Details
Prestressed Beam-Details
Railing Details-1
Railing Details-2
... Framing Details
... & Bearing

ESTIMATE OF QUANTITIES

Item	Unit	Quantity Alternates A	Quantity Alternates B
Selected Granular Fill	C.Y.	140	140
Underdrain Filter	C.Y.	10	10
Structure Excavation	C.Y.	350	350
Perforated Metal Pipe Underdrain 6", 18 Gage	L.F.	150	150
Class A Concrete for Structures	C.Y.	45	27
Class A Concrete for Structures (Monolithic Bridge Slab with Integral Wearing Surface)	S.F.	3500	3500
Class B Concrete for Structures	C.Y.	210	210
Bagged Screened Aggregate	C.Y.	42	42
Bar Reinforcement for Structures	Lbs.	25,700	24,300
Steel Bridge Railing (2 Rail)	L.F.	105	105
Steel Bridge Railing (4 Rail)	L.F.	170	170
Bituminous Material	Gal.	58	58
Remove Existing Concrete Parapet	C.Y.	15	15
Stone Curb (Bridge Type)	L.F.	280	280
Bridge Bearing Pads (Elastomeric)	Ea.	10	-
Prestressed (Pretensioned) Concrete I Beams	L.F.	500	-
Epoxy Protective Coating for Concrete	S.F.	340	340
Linseed Oil Protective Coating for Concrete	Gal.	10	10
Structural Steel	Lbs.	-	95,800
Stud Shear Connector	Ea.	-	760

2


Paving
PROFILE
SECTION AT SPILLWAY
A
Revised



2

PROPOSED DAM
LAKE PEEKSKILL
PUTNAM VALLEY PUTNAM CO, N.Y.
LONG BEACH GARDENS INC.
SCALE - AS SHOWN NOV. 5, 1928.

PLATE 3

APPENDIX F

BACKGROUND DOCUMENTS

GENERAL BORING'S, INC.   STRAITSVILLE RD., PROSPECT, CONN.

SOILS CLASSIFICATION SYSTEM

DESCRIPTION	FROM	TO
BOULDERS	8"	+
COBBLES	2-1/2	8"
COARSE GRAVEL	1"	2-1/2
MEDIUM GRAVEL	3/8"	1"
FINE GRAVEL	2mm	3/8"
COARSE SAND	0.5mm	2mm
MEDIUM SAND	0.25mm	0.5mm
FINE SAND	.125	0.25mm
VERY FINE SAND	0.62	.125
SILT & CLAY	Less than 0.62mm	

Proportions Used –

Trace 0 to 10%   Little 10 to 20%   Some 20 to 35% and 35 to 50%

EXAMPLES –

"Brown fine sand Medium gravel"	Equal amounts of sand and gravel
"Brown medium to fine sand and gravel	Sample predominantly sand with 35 to 50% gravel
Some silt	20 to 35% silt
Boulders"	Various percentages –

GENERAL BORING'S, INC.   STRAITSVILLE RD., PROSPECT, CONN.

CORRELATION CHART

PENETRATION RESISTANCE & SOIL PROPERTIES

Predominant sand and gravel		Predominant silt and clay		
COHESIONLESS	SOILS	COHESIVE	SOILS	COMPRESSIVE
Blows per foot	Relative Density	Blows per foot	Consistency	Strength (qu*)
0 to 4	very loose	0 to 2	very soft	below .25
4 to 10	loose	2 to 4	soft	.25 to .50
10 to 30	medium	4 to 8	medium	.50 to 1.0
30 to 50	dense	8 to 15	stiff	1 to 2
over 50	very dense	15 to 30	very stiff	2 to 4
		over 30	hard	over 4

NOTES:
Above based on 2" O. D. sampler x 1-3/8" i.d. 140# Wt. x 30" Fall (qu*) = Tons per Square Foot

STATE OF CONNECTICUT BASIC BUILDING CODE

TABLE 15. PRESUMPTIVE SURFACE BEARING VALUES OF FOUNDATION MATERIALS

	CLASS OF MATERIAL	Tons per Square Foot
1	Massive crystalline bed rock including granite, diorite, gneiss, trap rock hard limestone and dolomite.	100
2	Foliated rock including bedded limestone, schist and slate in sound condition.	40
3	Sedimentary rock including hardshales, sandstones, and thoroughly cemented conglomerates.	25
4	Soft or broken bed rock (excluding shale) and soft limestone.	10
5	Compacted, partially cemented gravels, sand and hardpan overlying rock.	10
6	Gravel and sand-gravel mixtures.	6
7	Loose gravel, hard dry clay, compact coarse sand, and soft shales.	4
8	Loose, coarse sand and sand-gravel mixtures and compact fine sand (confined).	3
9	Loose medium sand (confined), stiff clay.	2
10	Soft broken shale, soft clay.	1.5

General Borings, Inc.

Sheet___ of ___

STRAITSVILLE ROAD PROSPECT, CONN. 06712

REPORT OF AUGER BORINGS AND PIPE AND BAR PROBINGS

TOWN Putnam Valley LINE Station 11+56

PROJECT NAME Peekskill Lake Bridge PROJECT NO. 575

FOREMAN R. Tuccillo DATE WORK DONE

INSPECTOR W. Cereska FOR Goodkind & O'Dea
CONTRACTING ENGINEER

Station	Offset (Ft.) From B L	Offset (Ft.) From C L	Depth Probed (Ft.)	Soil Strata in Auger Holes From (Ft.)	Soil Strata in Auger Holes To (Ft.)	Remarks (Include: Groundwater depth, Size of Auger used, Description of Soil in Auger Holes, Depth of Auger Samples)
						SOUNDINGS
					#1	5/8" Rod 18'-L
						Drove Rod 4'6"
						14'-L
					#2	1/2" Rod
						Drove rod 6'7"

CLIENT Goodkind & O'Dea

General Borings, Inc.
STRAITSVILLE RD. PROSPECT, CONN.

SHEET 1 OF 1
HOLE NO. S-1

CONTRACTOR

PROJECT NAME Peekskill Lake, Bridge

LINE ₵ 11+56

STATION 4

FOREMAN — DRILLER R. Tuccillo

LOCATION Putnam County

INSPECTOR W. Cereske

New York

OFFSET 0'

GROUND WATER OBSERVATIONS
AT 0.3 FT AFTER 0 HOURS
AT ____ FT AFTER ____ HOURS

	CASING	SAMPLER	CORE BAR
TYPE	HA	SS	AX
SIZE I.D.		1 3/8	1 3/8
HAMMER WT		140	Diamond &
HAMMER FALL		30"	Carbide

Date Start 11/1/68 Date Fin. 11/1/68
SURFACE ELEV 92.3
GROUND WATER ELEV.

DEPTH	CASING BLOWS PER FOOT	SAMPLE NO.	TYPE	PEN	REC	DEPTH @ BOT	BLOWS PER 6" ON SAMPLER (FORCE ON TUBE) 0-6	6-12	12-18	CORING TIME PER FT (MIN.)	DENSITY OR CONSIST MOIST	STRATA CHANGE DEPTH ELEV	FIELD IDENTIFICATION OF SOIL REMARKS INCL. COLOR, LOSS OF WASH WATER, SEAMS IN ROCK, ETC.
		1	ss	18"	12"	1'6"	4	7	10				1) Brown coarse-fine sand, some silt, trace med-fine gravel, trace root material 0'0"-1'6".
									Ft	Min			
										Refusal		4'	
5									1	1	Carbide		
									2	3		6'	Run#1 Drilled 4'0"-6'0". Recovered 0'-7" fractured greenish gray rock(soft).
									3	7			
									4	7	Diamond		
									5	8		Run#2	
									6	12		10'0"	Run#2 Drilled 6'0"-10'0". Recovered 2'10" greenish gray gneiss. Vertical and horizontal seam. (fractured)
10									7	8			
									8	9			
												Run#3 12'0"	Run#3 Drilled 10'0"-12'0" Recovered 1'5" greenish gray gneiss.
20													END OF BORING 12'
													4' Soil
													8' Rock
25													
30													
35													

TYPE OF SAMPLES
D = DRY W = WASHED C = CORED A = AUGER UP = UNDISTURBED PISTON
UB = UNDISTURBED BALL CHECK VT = VANE TEST

PROPORTIONS USED TRACE = 0-10%, LITTLE = 10-20%, SOME = 20-35%, AND = 35-50%

TOTAL FOOTAGE
EARTH BORING ____ FT.
ROCK CORING ____ FT.

CLIENT: Goodkind & O'Dea

General Borings, Inc.

STRAITSVILLE RD. PROSPECT, CONN.

SHEET 1 OF 1
HOLE NO. S-2

CONTRACTOR

FOREMAN —DRILLER

INSPECTOR W. Cereska

PROJECT NAME Lake Peekskill, Bridge

LOCATION Putnam County

New York

LINE ℄

STATION 11+56

OFFSET 18' R

GROUND WATER OBSERVATIONS
AT 13.5 FT AFTER 0 HOURS
AT ____ FT AFTER ____ HOURS

	CASING	SAMPLER	CORE BAR.
TYPE	HA	SS	AX
SIZE I.D.		1 3/8	1 3/8
HAMMER WT		140	Diamond &
HAMMER FALL		30"	Carbide

Date Start 10/30/68 Date Fin. ____
SURFACE ELEV. 92.4
GROUND WATER ELEV. ____

DEPTH	CASING BLOWS PER FOOT	SAMPLE NO.	TYPE	PEN	REC	DEPTH @ BOT	BLOWS PER 6" ON SAMPLER (FORCE ON TUBE) 0-6	6-12	12-18	CORING TIME PER FT (MIN.)	DENSITY OR CONSIST MOIST	STRATA CHANGE DEPTH ELEV	FIELD IDENTIFICATION OF SOIL REMARKS INCL. COLOR, LOSS OF WASH WATER, SEAMS IN ROCK, ETC.
		1	ss	1'6"	12"	1'6"	9	12	15				1) Brown coarse-fine sand, little silt, trace med-fine gravel.
									Ft.	Min.			
									1	4		3'7"	
									2	4		Run#1	Run#1 Drilled 3'7"-5'7" Recovered 0.7' greenish gray rock(fractured).
5									3	5		5'7"	
									4	6			
									5	6			
									6	4		Run#2	Run#2 Drilled 5'7"-10'1". Recovered 1'0" greenish gray soft rock.
10									7	6		10'1"	
									8	6			
									9	8			
									10	10		Run#3	Lost water at 7'6". Seam 8'11"-9'6".
									11	10		13'7"	
15									12	4			
									13	4		Run#4	Run#3 Drilled 10'1"-13'7". Recovered 2'4" greenish gray gneiss.
									14	5		14'7"	
									15	6			
												Run#5	
												18'7"	Water returned at 10'7".
20													
													Run#4 Drilled 13'7"-14'7". Recovered 0'-5" seamy fractured greenish gray gneiss.
25													
													Run#5 Drilled 14'7"-18'7". Recovered 2.0' greenish gray gneiss.
30													END OF BORING 18'7"
													3'7" Soil
													15'0" Rock
35													

TYPE OF SAMPLES

D=DRY W=WASHED C=CORED A=AUGER UP=UNDISTURBED PISTON
UB=UNDISTURBED BALL CHECK VT=VANE TEST

PROPORTIONS USED TRACE = 0-10%, LITTLE = 10-20%, SOME = 20-35%, AND = 35-50%

TOTAL FOOTAGE

EARTH BORING ____ FT.

ROCK CORING ____ FT.

CLIENT Goodkind & O'Dea	**General Borings, Inc.** STRAITSVILLE RD. PROSPECT, CONN.		SHEET 1 OF 1 HOLE NO. S-3
CONTRACTOR	PROJECT NAME Lake Peekskill, Bridge		LINE ℄ 12+56
FOREMAN — DRILLER R. Tuccillo	LOCATION Putnam County		STATION
INSPECTOR W. Cereske	New York		OFFSET 18'L

GROUND WATER OBSERVATIONS		CASING	SAMPLER	CORE BAR	
AT 2.0' FT AFTER 0 HOURS	TYPE	HA	SS	AX	Date Start 10/31 Date Fin. 10/31/6
AT ___ FT AFTER ___ HOURS	SIZE I.D.		1 3/8		SURFACE ELEV. 90.0
	HAMMER WT		140	BIT	GROUND WATER ELEV.
	HAMMER FALL		30"	Diamond	

DEPTH	CASING BLOWS PER FOOT	SAMPLE NO	TYPE	PEN	REC	DEPTH @ BOT	BLOWS PER 6" ON SAMPLER (FORCE ON TUBE) 0-6	6-12	12-18	CORING TIME PER FT (MIN.)	DENSITY OR CONSIST / MOIST	STRATA CHANGE DEPTH / ELEV	FIELD IDENTIFICATION OF SOIL REMARKS INCL. COLOR, LOSS OF WASH WATER, SEAMS IN ROCK, ETC.
		1	ss	18"	12"	1'5"	3	6	11				1) Brown coarse-fine sand, little silt, trace coarse-fine gravel. 0'0"-1'5".
									Ft.	Min.			
										Refusal		3'	
									1	1			
5									2	2		Run#1	Run#1 Drilled 3'0"-6'0". Recovered 0'-2" greenish gray rock (soft).
									3	2		6'	
									4	2			
									5	2		Run#2	
									6	2		9'	Run#2 Drilled 6'0"-9'0". Recovered 1'7" greenish gray rock--soft-fractured and seamy.
									7	2			
10									8	3			
												Run#3	Run#3 Drilled 9'0"-11'0". Recovered 0'-10" quartz with greenish gray seams.
												11'	
15													
20													
25													
30													
35													

END OF BORING
11'

3' Soil
8' Rock

TYPE OF SAMPLES

D = DRY W = WASHED C = CORED A = AUGER UP = UNDISTURBED PISTON
UB = UNDISTURBED BALL CHECK VT = VANE TEST

PROPORTIONS USED TRACE = 0-10%, LITTLE = 10-20%, SOME = 20-35%, AND = 35-50%

TOTAL FOOTAGE

EARTH BORING ___ FT.

ROCK CORING ___ FT.

CLIENT: Goodkind & O'Dea

General Borings, Inc.
STRAITSVILLE RD. PROSPECT, CONN.

SHEET 1 OF 1
HOLE NO. S-4

CONTRACTOR	PROJECT NAME: Lake Peekskill, Bridge	LINE: ℄ 12+56
FOREMAN —DRILLER: R. TUCCILLO	LOCATION: Putnam County	STATION
INSPECTOR: W. Cereska	New York	OFFSET: 14' R

GROUND WATER OBSERVATIONS
AT 2.6' FT. AFTER 0 HOURS
AT ___ FT AFTER ___ HOURS

	CASING	SAMPLER	CORE BAR
TYPE	HA	SS	AX
SIZE I.D		1 3/8	
HAMMER WT.		140	BIT
HAMMER FALL		30"	Diamond

Date Start 10/31/69 Date Fin. 10/31
SURFACE ELEV. 92.2
GROUND WATER ELEV.

DEPTH	CASING BLOWS PER FOOT	SAMPLE NO.	TYPE	PEN	REC	DEPTH @ BOT	BLOWS PER 6" ON SAMPLER (FORCE ON TUBE) 0-6	6-12	12-18	CORING TIME PER FT (MIN.)	DENSITY OR CONSIST / MOIST	STRATA CHANGE DEPTH / ELEV	FIELD IDENTIFICATION OF SOIL REMARKS INCL. COLOR, LOSS OF WASH WATER, SEAMS IN ROCK, ETC.
		1	ss	18"	8"	1'6"	2	6	12				1) Brown coarse-fine sand, little coarse-fine gravel, little silt. 0.0'-1'6".
5		2	"	12"	4"	6'0"	13	38	50/3"				2) Gray-brown coarse-fine sand and silt, trace med-fine gravel. 5'0"-6'0"
									Ft	Min	Ref.	6'6"	
		2A	"	3"	3"	6'3"			1	2			2A) Greenish gray soft decomposed rock. 6'0"-6'3"
									2	2		Run#1 8'6"	
									3	2			
10									4	3			Run#1 Drilled 6'6"-8'6". Recovered 0'-4" greenish gray rock fragments.
									5	2			
									6	2			
									7	3			
												Run#2 10'6"	Run#2 8'6"-10'6"(drilled). Recovered 0'-5" greenish gray rock fragments.
20												Run#3 13'6"	Run#3 Drilled 10'6"-13'6" Recovered 1'6" greenish gray rock.
25													END OF BORING 13'6"
													6'6" Soil 7'0" Rock
30													
35													

TYPE OF SAMPLES
D = DRY W = WASHED C = CORED A = AUGER UP = UNDISTURBED PISTON
UB = UNDISTURBED BALL CHECK VT = VANE TEST

PROPORTIONS USED TRACE = 0-10%, LITTLE = 10-20%, SOME = 20-35%, AND = 35-50%

TOTAL FOOTAGE
EARTH BORING ___ FT.
ROCK CORING ___ FT.

APPENDIX G

STABILITY COMPUTATIONS

MICHAEL BAKER, JR., INC.
THE BAKER ENGINEERS

Box 280
Beaver, Pa. 15009

Subject: Lake [illegible] Dam
Stability Analysis

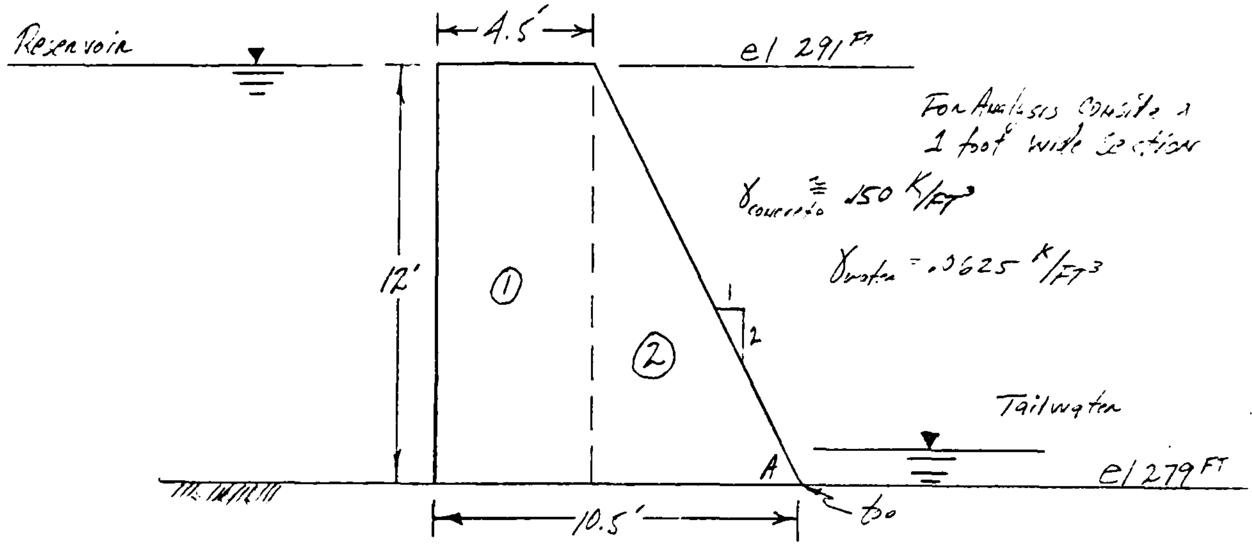
S.O. No. [illegible] - AAA

Sheet No. 1 of 9

Drawing No.

Computed by [illegible] Checked by JGU Date [illegible] 11, 1991

(Overflow Section)



Section	Volume (FT^3)	γ	W	Distance from toe	M (K-FT)
1	4.5 (12)(1)	$.150\ ^K/_{FT^3}$	8.1 kips	8.25 FT	66.825
2	½ (6)(12)(1)	.150	5.4 kips	4.0 FT	21.6
			13.5 K		88.425

Resultant = 13.5^K

location = $\dfrac{88.425}{13.5} = 6.55$ FT from toe

Cases to Be Considered

I Normal Pool level, Full Uplift

II Same as I plus Ice loading

III ½ PMF Conditions, full Uplift

IV Full PMF, Full Uplift

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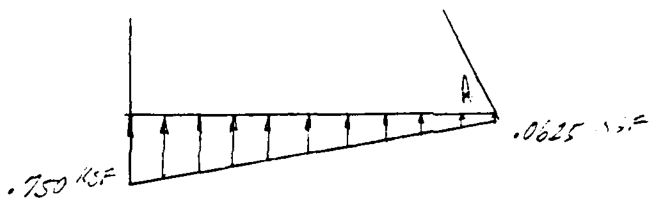
Subject [illegible]
S.O. No. [illegible]
Sheet No. 2 of 9
Drawing No.
Computed by [illegible] Checked by JGU Date [illegible]

Grp I

Reservoir level 291 FT H_w = 12 FT
Tailwater level 280 FT H_w = 1 FT

Uplift

Reservoir = 12 (.0625) = .750 KSF
Tailwater = 1 (.0625) = .0625 KSF



Resultant = $\left(\frac{.750 + .0625}{2}\right)(10.5)(1) = 4.266$ Kips

location = $\dfrac{[.0625(10.5)]\frac{10.5}{2} + [(.750-.0625)\frac{1}{2}(10.5)]\frac{2}{3}(10.5)}{4.266}$

= 6.731 FT from toe

Hydrostatic Pressure

Reservoir Resultant = $\frac{1}{2}(12)^2(.0625) = 4.5^k$
location = 12/3 = 4 FT from base level (el 279)

Tailwater Resultant = $\frac{1}{2}(1)^2(.0625) = .031^k$
location = 1/3 = .333 FT from base level

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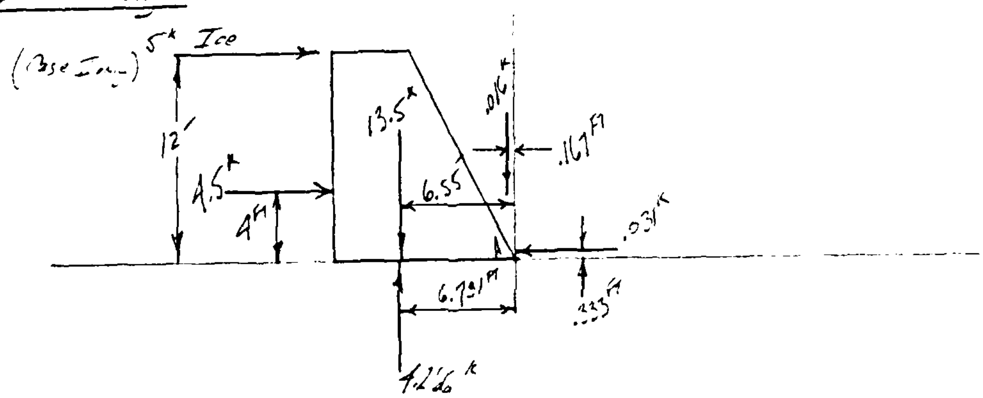
Additional Vertical loading due to tailwater

Resultant = (1)(½)(½)(.0625) = .016 kips

location = (½)(⅓) = .167 ft from top

Case I + II Loadings



Case I

$$F.S._{overturning} = \frac{13.5(6.55) + .016(.167) + .031(.333)}{4.5(4) + 4.266(6.731)}$$

$\boxed{F.S._{overturning} = 1.373}$

Sliding

$R = \Sigma V (\tan \phi) + CA$

$= (13.5 + .016 - 4.266).7 + 10.5(2)$

$= 27.475$

$C = 2$ KSF

$A = 10.5$ ft²

$\tan \phi = .7 \qquad \phi = 30°$

$H = 4.5 - .031 = 4.469$

$$F.S. = R/H = \frac{27.475}{4.469}$$

$\boxed{F.S._{sliding} = 6.148}$

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Case II

Overturning

$$F.S._{\text{overturning}} = \frac{13.5(6.55) + .016(.167) + .031(.333)}{4.5(4) + 4.266(6.731) + 5(12)}$$

$$\boxed{F.S._{\text{overturning}} = 0.821}$$

Sliding

$R = 27.475$

$H = 4.469 + 5 = 9.469$

$$F.S._{\text{sliding}} = \frac{27.475}{9.469}$$

$$\boxed{F.S._{\text{sliding}} = 2.902}$$

Case III

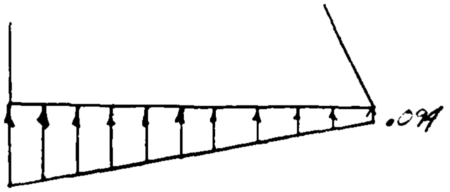
Reservoir Pool level = 294.4^{FT} $H_w = 15.4^{FT}$

Tailwater level = 280.5^{FT} $H_w = 1.5^{FT}$

Uplift

Reservoir Side = $15.4(.0625) = 0.963^{KSF}$

Tailwater Side = $1.5(.0625) = .094^{KSF}$



Resultant = $\left(\frac{.963 + .094}{2}\right) 10.5 = 5.549^{Kips}$

Location = $$\frac{[(.094)10.5]\frac{10.5}{2} + [(.963 - .094)(\frac{1}{2})10.5]\frac{2}{3}(10.5)}{5.549} = 6.637^{FT}$$

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Subject: Lake [illegible] Dam
Stability Analysis
S.O. No. [illegible]
Sheet No. 5 of 9
Drawing No.
Computed by DWM   Checked by JGU   Date May 11, 199[illegible]

Hydrostatic Pressure

Reservoir

Bottom Dam $= 15.4(.0625) = 0.963$ KSF

Top Dam $= 3.4(.0625) = .213$ KSF

Resultant $= \left(\frac{.963+.213}{2}\right)12 = 7.056$ Kips

$$\text{location} = \frac{[(.213)(12.0)]\frac{12.0}{2} + [(.963-.213)\tfrac{1}{2}(12.0)]\frac{12.0}{3}}{7.056}$$

$= 4.724$ FT above base level

Tailwater

Resultant $= \frac{1}{2}(1.5)^2(.0625) = .070$ Kips

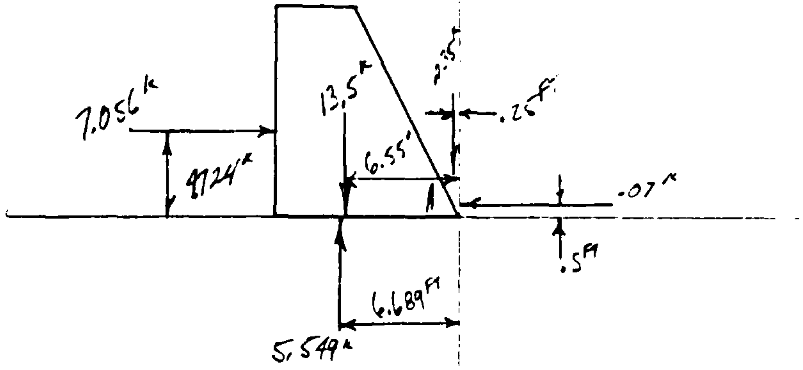
location $= \frac{1.5}{3} = .5$ FT above base level

Additional Vertical Loading Due to Tailwater

Resultant $= \frac{1}{2}(1.5)\left(\frac{1.5}{2}\right)(.0625) = .035^k$

location $= \left(\frac{1.5}{2}\right)\frac{1}{3} = .25$ FT from toe of Dam

Case III Loadings



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Subject: Lake [illegible] Dam — Stability Analysis
S.O. No. 13338-02-ARA
Sheet No. 6 of 9
Drawing No.
Computed by: VJM Checked by: JGU Date: May 11, 1981

Overturning

$$F.S._{\text{overturning}} = \frac{13.5(6.55) + .035(.25) + .07(.5)}{7.056(4.724) + 5.549(6.689)}$$

$\boxed{F.S._{\text{overturning}} = 1.256}$

Sliding

$$R = (13.5 + .035 - 5.549).7 + 2(10.5)$$
$$= 26.59^{k}$$
$$H = (7.056 - .07) = 6.986^{k}$$
$$F.S. = R/H = \frac{26.59}{6.986}$$

$\boxed{F.S._{\text{sliding}} = 3.806}$

Case IV

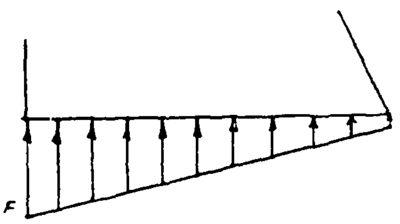
Reservoir Pool level = 296.5 $H_w = 17.5$ FT

Tailwater level = 281.0 $H_w = 2.0$ FT

Uplift

Reservoir Side = $17.5(.0625) = 1.094$ KSF

Tailwater Side = $2.0(.0625) = .125$ KSF



$$\text{Resultant} = \left(\frac{1.094 + .125}{2}\right)10.5 = 6.4 \text{ kips}$$

$$\text{location} = \frac{\left[(.125)(10.5)\frac{10.5}{2} + (1.094 - .125)(\tfrac{1}{2})(10.5)\right]\frac{10.5(2)}{3}}{6.4}$$

$= 6.641^{FT}$ from toe

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Subject: Lake Pocotopaug Dam — Stability Analysis — S.O. No. [illegible] — Sheet No. 7 of 9 — Drawing No. — Computed by DUJM — Checked by JGU — Date May 11, 1981

Hydrostatic Pressure

Reservoir Top Dam $= (17.5-12)(.0625) = .344^{KSF}$

Bottom Dam $= 17.5(.0625) = 1.094^{KSF}$

Resultant $= \left(\frac{1.094 + .344}{2}\right)(12) = 8.628$ kips

Location $= \frac{[.344(12)]\frac{12}{2} + [(1.094-.344)\frac{1}{2}(12)]\frac{12}{3}}{8.628}$

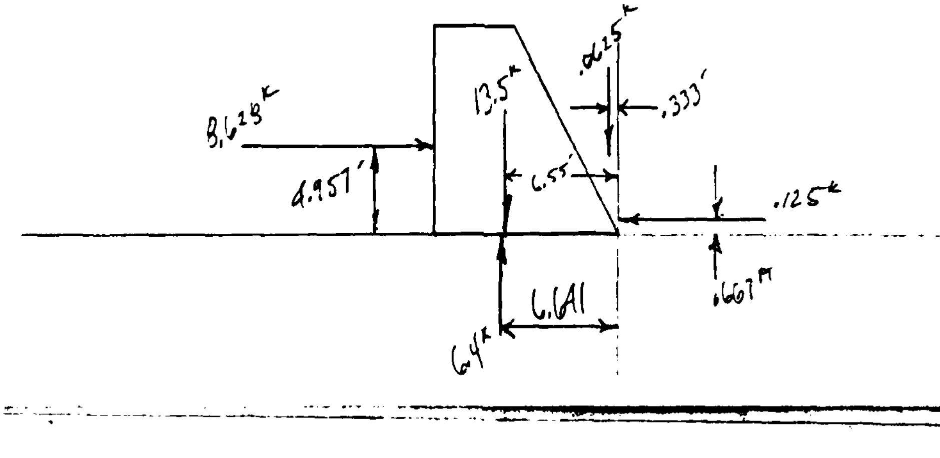
$= 4.957^{FT}$ above base level

Tailwater =
Resultant $= \frac{1}{2}(2)(2)(.0625) = .125$ kips
location $= \frac{2}{3} = .667^{FT}$ above base level

Additional Vertical Loading Due to Tailwater

Resultant $= 2(\frac{2}{2})\frac{1}{2}(.0625) = .0625^{k}$
location $= (\frac{2}{2})\frac{1}{3} = .333^{FT}$ from toe

Case IV Loadings



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Subject: Lake Loch...n Dam — Stability Analysis
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Overturning

$$F.S._{overturning} = \frac{13.5(6.55) + (.0625)(.333) + .125(.667)}{8.623(4.957) + 6.4(6.541)}$$

$$\boxed{F.S._{overturning} = 1.038}$$

Sliding

$R = (13.5 + .0625 - 6.4).7 + 2(10.5)$
$= 26.014$

$H = (8.628 - .125) = 8.503$

$F.S. = R/H = \frac{26.014}{8.503}$

$$\boxed{F.S._{sliding} = 3.059}$$

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Resultant Location $\Rightarrow \dfrac{\Sigma M}{\Sigma V}$

Case I

$$\text{Resultant Location} = \frac{13.5(6.55)+.016(.167)+.031(-.333)-4.5(4)-4.266(6.731)}{13.5+.016-4.266}$$

$= \underline{4.511}$ FT from Toe

Case II

$$\text{Location} = \frac{13.5(6.55)+.016(.167)+.031(.333)-4.5(4)-4.266(6.731)-5(12)}{13.5+0.16-4.266}$$

$= \underline{-1.976}$ FT

Case III

$$\text{Location} = \frac{13.5(6.55)+.035(.25)+.07(.5)-7.056(4.724)-5.549(6.689)}{13.5+.035-5.549}$$

$= \underline{2.256 \text{ FT}}$

Case IV

$$\text{Location} = \frac{13.5(6.55)+.0625(.333)+.125(.667)-8.628(4.957)-6.4(6.641)}{13.5+.0625-6.4}$$

$= \underline{0.455 \text{ FT.}}$

END

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